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EVALUATION

of

AID LOAN 489-T-08

Office of Rural Development

Suweon, Republic of Korea

June 6, 1978

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I. INTRODUCTION

A. History of Agricultural Research in Korea

The first Korean agricultural demonstration center was established in 1905 at Dukseom by the Royal Korean Government. This center was expanded and subsequently moved to Suweon in 1907. It was taken over by the Japanese in 1910 following their occupation of Korea. Later, during the Japanese period, a network of stations was established with emphasis chiefly devoted to the improvement of rice production. There were a total of nine of these stations, one for each of the southern peninsular provinces, and also livestock reproduction stations in other locations of these same provinces. With the Japanese invasion of Manchuria in the late1930's, a greater emphasis was placed on rice production in Korea, and a special rice experiment station was based at Iri at the site of an earlier station.

This general pattern of stations continued through World War II and the interim period between World War II and the Korean War. Following the severe destruction of many of these stations and institutes during the Korean War, the United Nations Reconstruction Agency (UNKRA) and the Korean Civil Assistance Command (KCAC) were instrumental in the repair and reconstruction of numerous research facilities, to the extent priorities and funds permitted.

In 1955 the US economic aid program took over all the KCAC continuing assistance and much of the UNKRA program. Assistance to agricultural research continued as a direct grant program until 1974. This was superseded by an intergovernment loan, AID/L 489-T-088, for five million US dollars - the subject of this evaluation.

B. Organization of ORD

The introduction of US concepts of completely integrated research and extension work in agriculture to the Republic of Korea (ROK) was initiated in 1955. This program was coordinated with higher education activities in agriculture, for which the Ministry of Education (Min. Ed.) was and still is responsible. To simplify overall administration within the Ministry of Agriculture and Forestry (MAF), and to make most efficient and effective use of available local and foreign technical personnel, a single comprehensive project for all MAF research activities was started and paralleled by an extension project to introduce US extension concepts and training methods to the ROK. Legislation passed by the ROK National Assembly (ROKNA) in 1957 encouraged the initiation of integrated research and extension work into an Institute of Agriculture (IAS) as a major division of MAF that evolved into the present Office of Rural Development (ORD).

This continuous input into agricultural research and extension activities by the ROK assisted with funds from the US foreign

assistance and other binational and multinational programs has made the ROK agricultural expansion rate one of the greatest in world's history.

The present organization of ORD with the temporary advisory relationship of the Crops Improvement Research Center (CIRC) within the framework of ORD is given in Fig. 1. Table 1 shows in detail the kinds and locations of all ORD personnel and the numbers and types of research project titles as of 1978.

The present organization of ORD is composed of the Planning and Management Office, the Research Bureau, the Rural Guidance Bureau, the Techniques Dissemination Bureau, and the Farm Management and Research Office. There are also 12 research organizations including the Agricultural Science Institute, the Crop Experiment Station, and other major research facilities as shown in Fig. 1.

At the local level there are 9 Provincial Offices of Rural Development, 1973 City and County Rural Guidance Offices, and 1,471 Branch Guidance Offices at the township level.

Fig. 1. Organization of ORD Integrated with CIRC

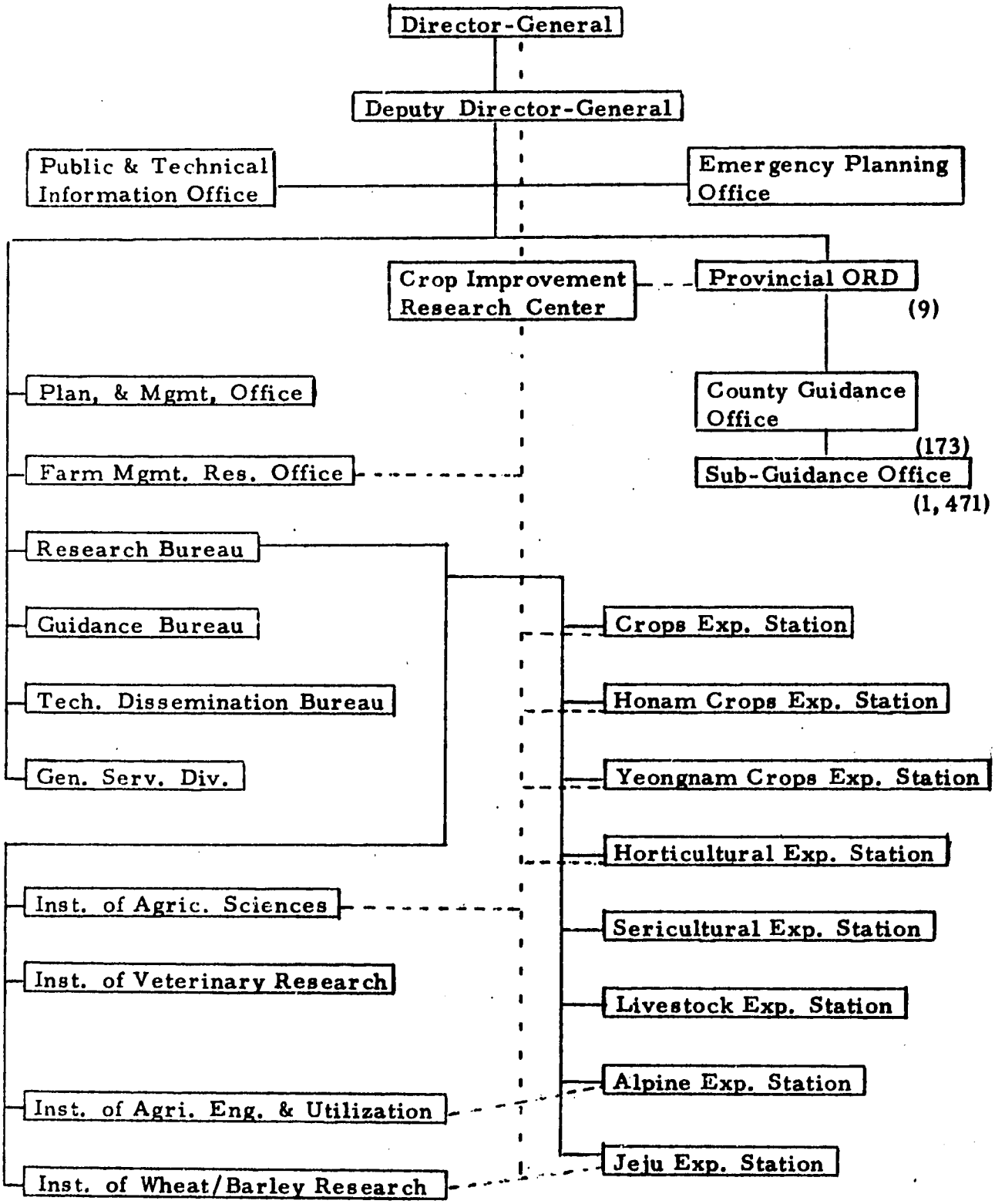


Table 1. Personnel and Research Subjects in ORD

A. Staffing (March, 1978)

Function / Organization	Research personnel	Extension personnel	Additional personnel	Total
Main ORD	589	84	927	1,600
Provincial, city & county offices	252	7,544	-	7,796
Total	841	7,628	927	9,396

B. Research Project Titles (1978)

Field	Food grains	Livestock	Others	Total
No. of titles	735	148	471	1,354

C. Functions of ORD

1. General

The major goals of ORD are 1) increased food production, 2) increased rural income, and 3) self-development. ORD has also four major functions: 1) research for improved farming techniques, 2) guidance for the improvement of rural life, 3) rapid dissemination of successful research results to farmers, and 4) farm management research for improved farming structures and marketing systems of farm products.

These functions are supported by the following priority programs:

a. Continuous and Intensive Implementation of Programs for Increased Food Production.

b. Improvement of Physical Infrastructure, and Farm Land Development and Conservation.

c. Acceleration of Farm Mechanization and its Training Programs.

d. Implementation of the Second-Phase Programs for Increased Rural Income.

e. Expanded Programs for Increased Cash Crop Production.

f. Increased Livestock Production.

g. Implementation of Self-Reliance Programs for Primary Agricultural Cooperatives.

h. Increased Savings by Farmers and Fishermen, and Modernization of Rural Dwellings.

i. Increased Support of Farmers Through Farm Loans.

j. Development of Coastal and Off-Shore Areas and Deep Sea Fishing.

2. Cooperation with International Research Organizations and Other Foreign Institutions

ORD maintains close cooperative relations with several international research organizations (see Table 2) including FAO, CIMMYT, IRRI, CIAT, IITA, ICRISAT, AVRDC, INTSOY, and CIP. In addition, close relations are maintained with the USDA and various U.S. universities. Similar relations are maintained with institutions in Japan, UK, West Germany, the Netherlands, and Dennmark. Korea benefits greatly from these relationships, but the cooperation is not one-sided. There is an exchange of plant material, technology and services in both directions.

The relationship with IRRI has been especially significant in that the origin of the "Tongil" rice revolution in Korea was based upon Korea-IRRI cooperation and collaboration. Most recently Korea, through the CIRC program, has established a rice cold-tolerance nursery. This is the first cold-water facility with controlled temperatures in the world, and IRRI is sending material and scientists to Korea to cooperate in this program.

3. Delivery of Information to Farmers

There exists an efficient organization for the transfer of information from research to extension and its ultimate delivery to the farmer. ORD contains a Bureau of Research and a Bureau of Guidance (extension), heading up the research and extension activities, respectively, and the Bureau of Guidance has an information section responsible for the preparation of radio programs and printed releases. The Provincial Offices of Rural Development, which come under the Guidance Bureau of ORD and which perform the extension function, have a similar internal organization with their own Research and Guidance Bureaus. There is, therfore, a very close organizational relationship between research and extension at both national and provincial levels.

Relations between farmers and extension workers are said to be very good. There appears to be a commendable attitude of dedication to service on the part of the extension personnel. The release and huge success of the Tongil type rice varieties apparently provided a very useful break-through for the extension workers, enabling them to gain the confidence of the farmers.

Table 2. Status of Cooperative Activities with International Research Organizations

Item / Organization	Foreign fund support ($1,000)	Invit. of consultants (Pers.)	Overseas training (Pers.)	Proc. of equip. (type)	Joint res. activities (No.)
AID	5,000 (Loan)	36	101	938	27
Korean-Japanese	1,746	4	48	180	80
Korean-U.K (Farm mach. trang.)	697	18	2	220	4
Korean-U.K. (Farm equip. res.)	286	3	-		4
Korean-U.K. (Methane gas dev.)	53	1	-	5	5
Korean-U.K. (Livestock dev. in Jeju)	251	2	2	3	-
Korean-German	2,000	24	28	291	6
IRRI (Farm m. . res.)	18.8	-	-	12	4
IRRI (Rice res.)	-	10-yr period	46	-	2
INTSOY	-	4-yr period	7	-	2
CIP	230	2	4	-	1
AVRDC	130	1	7	1	7
CIMMYT	-	2-yr period	10	-	2

D. Weaknesses and Problems in ORD

The recent rapid development of agricultural research in ORD is noticeable. In 1972, however, special attention had to be paid in the areas of rice breeding, wheat/barley production, soybean cultivation, seed potato production and storage, and in the development of adequate multiple cropping systems to increase the land utilization rate.

Table 3 presents the yields of the best breeding varieties in 1972 which was then considered inadequate and the new yield levels projected under the AID project as a result of improved research.

Table 3. Breeding Goal in Each Crop

unit: kg/10a

Crop	Current ('72)	Goal ('79)
Rice	479	600
Wheat	430	520
Barley	310	410
Soybeans	198	320
Potatoes	1,900	3,000

Another critical weakness was the lack of fully qualified researchers in sufficient numbers. As seen in Table 4, there were

only 15 Ph. D. holders in 1972 as compared to 60 in 1978, partially as a direct result of the AID project.

Table 4. Academic Degrees of Research Officials in Main ORD

Degree	Ph. D.	MS	BS	Total
1972	15	42	438	495
1978	60	130	399	589

E. Establishment of CIRC

The Korean Agricultural Sector Survey (KASS) Report in 1972 recommended an investment of some 15 to 20 million dollars in agricultural research during the next 10 years. Based on this report, ORD submitted an AID/Loan proposal in November 1972 for $7,000,000 for a period of 4 years from 1974 to 1977.

The proposal was revised in May 1973 to $5,000,000 with a period of 5 years from 1974 through 1978. This project was signed by both parties in January and announced in February 1974.

The loan conditions were a 10-year deposit period, with 2% interest per annum and a 3-year reimbursement period with an interest rate 3% per year.

The goal of this project was to enhance the quality of life through increases in crop production and farmers' incomes. The

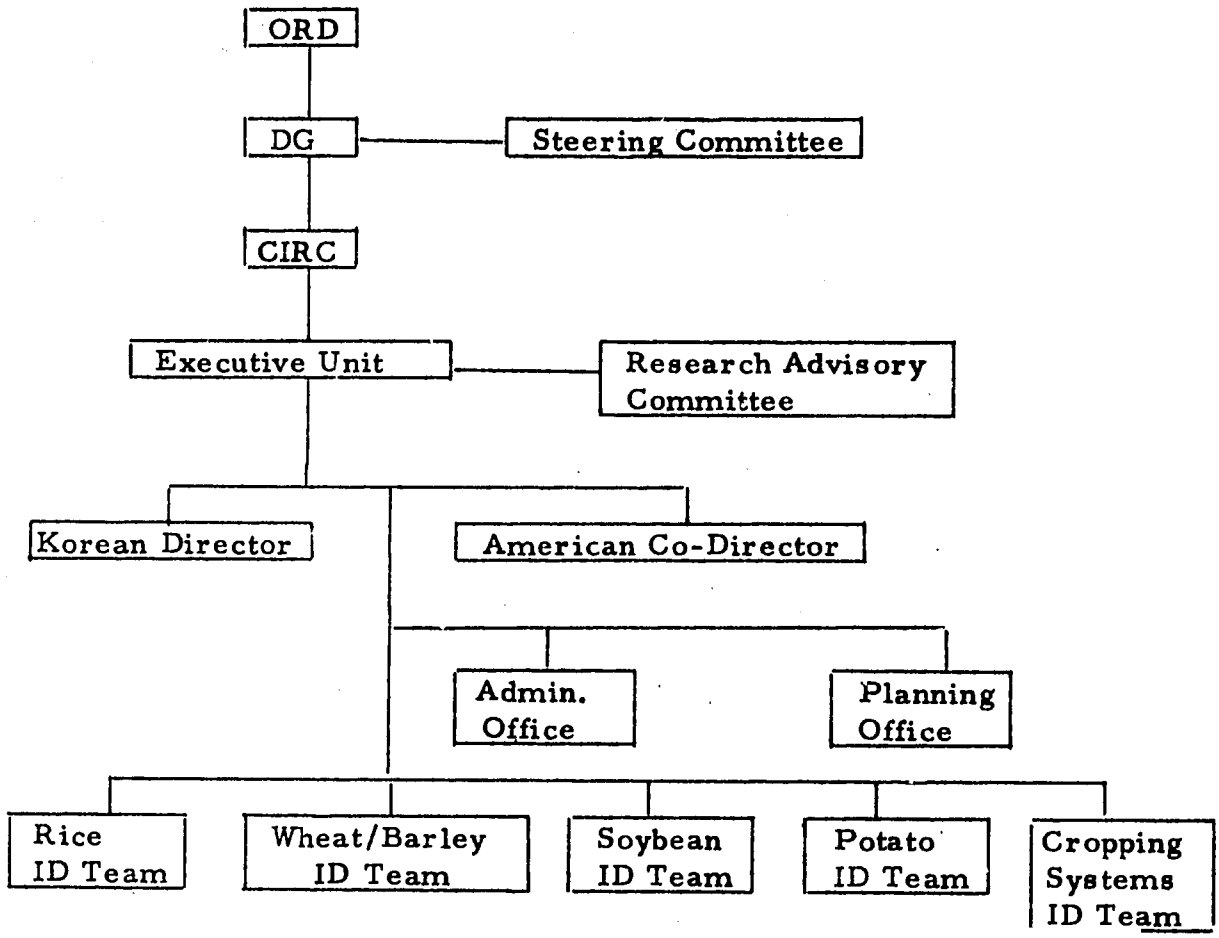
purpose was to improve the quality of agricultural research in Korea through training of staff and acquisition of essential research facilities.

This Crop Improvement project focused on 5 areas: 1) rice, 2) wheat/barley, 3) soybeans, 4) potatoes, and 5) multiple cropping systems.

F. Organization of CIRC

Figure 2 shows the organization of CIRC. As noted, inter-disciplinary research teams (ID teams) are the main component of CIRC, with foreign experts as team leaders of each ID team.

Fig. 2. Structure of the Crop Improvement Research Center (CIRC)



The Interdisciplinary Research Committees (ID Teams) were designated as action groups for the research portion of the project by the Crop Improvement AID Loan Project Book. These ID teams were to be comprised of outstanding scientists in each commodity area, representing a broad cross-section of institutions throughout Korea. These teams were to develop a coordinated national thrust in a given crop. Early in 1977, ORD officially incorporated the ID Committee concept into its official operating manuals. Six ID teams were regularized and placed under the coordination of the Research Bureau. A Grade 2 research coordinator from the Research Bureau was appointed as team chairman, and an American counterpart as Co-Chairman. The first six ID Committees were Rice, Barley/Wheat, Soybeans, Potatoes, Multiple Cropping, and Agricultural Mechanization. In 1978, the Livestock Experiment Station and the Horticulture Experiment Station proceeded to organize their respective research activities along interdisciplinary research lines.

These teams have been very successful in bringing together research scientists from a broad cross-section of Korean research institutions, Colleges of Agriculture, etc. There has evolved a closer and more integrated relationship between plant breeders, entomologists, plant pathologists and soil scientists.

With the adoption of the ID Team concept, lower ranking research scientists were assigned to the ID Committees and were involved later in administration. This was a natural consequence in that the ID Teams had been making budgetary recommendations to CIRC, and this under normal Korean procedures is not customary. Scientists are now more involved at the sub-Committee level of the ID Teams and thus make their recommendations known at that level of input.

The Interdisciplinary Research Team concept has been institutionalized within ORD as the procedures for I. D. committee promulgated on Dec. 15, 1976 call for. The Director/General of ORD must follow this closely to assure that, each year when different research ID Teams hold evaluation and planning meetings, there is broad participation of the different I. D. members from different organizations represented therein.

Special attention should be given to presenting the I. D. Committee materials, plannings and evaluations, in both English and Korean languages. This has not been successfully carried out during the current life of the project. Because of the lack of bilingual presentation, the contributions by the I. D. Team Leaders (American staff) have often been less than effective.

In some instances, research topics have been assigned after the Steering Committee meetings. These topics were not discussed at the I.D. meetings. Greater care must be given to reinforcing the I.D. Committees so that administrative requirements are funneled through the I.D. Committees. Administrative requirements must not erode the authority or area of responsibility the I.D. Committees must plan for.

ORD should still consider making the decision that all research funds allocated by the Director-General, presently on the basis of work areas, i.e., rice, barley, etc., should henceforth be allocated to the respective I.D. Committees.

Funds for administration would continue to go directly to the Directors of the respective experiment stations. It would also be more appropriate for the Interdisciplinary Committees to allocate funds where the greatest needs for research are rather than by commodity alone.

G. Major Accomplishments of the CIRC Project

The major accomplishments of the AID/Loan Crop Improvement project are summarized in Tables 5, 6, 7, 8 and 9. Table 5 indicates the number of research subjects completed, and Table 6 summarizes the consultancies by foreign experts. A total of 171

trainees were dispatched to the USA (Table 7). Table 8 summarizes the procurement of research equipment for the Central Laboratory and experiment stations. Table 9 lists the facilities and improvements supported and completed with CIRC counterpart funds.

Table 5. Research Subjects and Budget

Unit: 1,000 won

	'74		'75		'76		'77		'78		Total	
	Subject	Budget	Subject	Budget	Subject	Budget	Subject	Budget	Subject	Budget	Subject	Budget
Rice	3	13,680	20	18,301	15	17,833	12	19,550	9	10,800	59	80,164
Wheat/Barley	1	15,801	18	20,200	28	20,268	10	10,195	5	9,700	62	76,164
Soybean	3	3,249	9	9,295	27	18,265	14	12,134	8	6,600	61	49,543
Potatoes	2	4,641	9	10,832	16	13,071	12	6,982	12	8,700	51	44,226
Cropping Systems	15	10,863	13	11,375	19	28,405	15	20,653	18	22,200	80	93,496
Total	24	48,234	69	70,003	105	97,842	63	69,514	52	58,000	313	343,593

Table 6. Consultancies by Foreign Experts

Item	Original ('74)		Adjustment('77)		Adjustment ('78)	
	Psn.	Months	Psn.	Months	Psn.	Months
		Month day		Month day		Month day
1. Long-term	11	550	9	349	10	285.09
Co-Director	1	58	1	46	2	46.00
Team Leader	4	216	5	213	5	173.06
Biometrician	1	54	3	90	1	36.00
Entomologist	1	48			1	6.03
Others	4	178			1	24.00
2. Short-term	6 Fields	108	6 Fields	108	73	66.10
Total		658		457	83	351.19

Table 7. Overseas Training

Item	Persons				Cost ($1,000)			
	Original (A)	1st Adjust-ment (77.4)	2nd Adjust-ment(78.2) (B)	Difference (B-A)	Original (A)	1st Adjust-ment	2nd Adjust-ment (B)	Difference (B-A)
Ph. D.	13	20	22	9	370	566	729	359
M. Sc.	19	23	18	-1	361	437	326	-35
Short-term training	48	48	87	39	368	368	386	18
Observation/ Conference	25	44	44	19	10	10	152	142
Total	105	135	171	66	1,109	1,504	1,593	484

Table 8. Procurement of Equipment

Unit: $

Field	Original	1st Adjustment	2nd Adjustment	Final Adjustment
Central Lab.	230,000	646,000	240,000	425,000
Farm Machinery Work Shop	70,000	70,000	70,000	70,000
Computer	200,000	285,000	240,000	240,000
Library Equipment	400,000	285,000	85,000	88,000
Books			200,000	200,000
WBI	140,000			147,581
CES				283,649
IAS				111,957
HES				19,631
YCES				83,881
HCES				72,946
AES				33,872
IAEU				60,000
JES				5,583
PORDs				9,900
Glassware & Chemicals			123,000	73,000
Research Materials		73,000	342,000	
Total	1,040,000	1,359,000	1,300,000	1,925,000

Note: WBI : Wheat and Barley Research Institute; CES : Crop Expt. Station
IAS : Institute of Agric. Sciences; HES : Horticultural Expt. Station
YCES: Yongnam Crop Expt. Station; AES : Alpine Expt. Station
IAEU: Institute of Agricultural Engineering and Utilization
JES : Jeju Expt. Station; PORDs : Provinces Office of Rural Development

Table 9. Augmentation of Research Facilities

Facility	Scale	Completed	Budget (1,000₩)	Remarks
Low temperature seed storage facility	494.8 m^2	Dec. '74	30,401	ORD
Siphon System	1 system	May. '76	12,344	CES
Rice Svc, Bldg.	1,056 m^2	May. '76	41,146	CES
Upland Svc. Bldg.	1,056 m^2	May. '76	43,483	CES
Rice Svc. Bldg.	1,050 m^2	Dec. '76	31,300	YCES
Rice Svc. Bldg.	924 m^2	Dec. '76	32,030	HCES
Foreigners' Apts.	2,008 m^2	Aug. '76	173,894	
Central Lab.	622 m^2	Apr. '77	44,231	
Rice Cold-tolerance facility	2 ha	Jun. '77	18,890	CES
Gyehwado Station facility	350 m^2	Dec. '77	13,000	HCES

Facility	Scale	Completed	Budget (1,000₩)	Remarks
Mokpo Branch Station soil improvement		Nov. '77	4,374	Mokpo
Namyang Reclamation facility	11,154 m^2	Dec. '77	7,132	CES
Installation of sprinkler	12 sets	Dec. '77	17,207	B/W
Rice Cold-tolerance facility	2,640 m^2	Aug. '78	20,000	CES
Gyehwado Reclamation facility	400 m^2	June. '78	20,000	HCES
Namyang Reclamation facility	400 m^2	Aug. '78	20,000	CES
Total			529,432	

Note: CES : Crop Expt. Station
B/W : Wheat and Barley Research Institute
HCES: Honam Crop Expt. Station
ORD : Office of Rural Development
YCES: Yongnam Crop Expt. Station

II. EVALUATION OF AGRICULTURAL RESEARCH

A. Crop Improvement

1. Rice

Korean agriculture revolves around rice (Oryza sativa L.), and all other agricultural activities must accommodate themselves to its production. An examination of Table 10 shows rice to be the one crop in which both the researcher's and farmer's yield goals have been achieved. Table 11 shows progress in getting earlier maturing high yieling varieties (HYV's). In addition, very respectable progress has been made in breeding for cold tolerance, disease resistance, insect resistance, saline tolerance and in the mechanization of rice cultivation. Because there are many new traits which need to be incorporated into the Tongil plant type, continued examination of realistic breeding priorities must be assessed. This is necessary to assure stabilization of the dramatic increases of rice yields which have been made. The Interdisciplinary Rice Committee (IDRC) should be strengthened and encouraged to coordinate and develop the priorities by which the independent research programs at CES, Suweon; HES, Honam; and YES, Youngnam are thoroughly complementary in their thrust. The IDRC published a 135 page "The Scope of Rice Production, Use and Research in Korea," report which outlines research and production constraints followed by

identification and required fortification of research activities essential to the acceleration of the overall national rice research program. This has been an excellent briefing document for all IDRC members, administrators, consultants and other interested scientists.

As of 1978, the IDRC is composed of representatives from the organizations indicated in Table 12. The IDRC and the consultants to the rice program have identified the following as areas of breeding priorities which continue to be of immediate concern:

1. Blast disease resistance
2. Bacterial leaf blight disease resistance
3. Black streak dwarf virus resistance
4. Brown planthopper resistance
5. White-backed planthopper resistance
6. Cold tolerance
7. Salinity tolerance
8. Earliness
9. High yielding capacity
10. Improved grain quality

To assure integrated progress, it is critical that the Director-General of ORD continue to stress the close cooperation of the discipline-oriented scientists with the crop-oriented scientists. Thus the plant pathologists, entomologists, geneticists, and soil

scientists from the Institute of Agriculture Sciences (IAS) and the breeders and the cultural practice scientists from CES, YES and HES must cooperate and coordinate their research activities through their respective Interdisciplinary Committees.

One of the outstanding contributions of the CIRC program has been the development of the cold water screening facility located at Chuncheon in Gangweon Province. This facility, which is unique in terms of technique and capacity, offers an opportunity for some very productive collaborative research between Korean and IRRI scientists. This facility should expedite research into the relationships of tolerance to cold water and tolerance to cold air at different stages of growth, and subsequently to allow the delineation of screening techniques for various low temperatures in rice growing regions throughout the world.

Table 10. Progress Towards the Achievement of Productivity Goals for Crops, M/T per ha.

Crop	Current Status (1977) 1/		Target 2/	
	Farm Yield	Research Yield	Farm Yield	Res. Yield
Rice	4.94	5.00	4.50	6.00
Barley	1.46 3/	4.00	3.00	3.60
Wheat	1.68 3/	4.00	4.00	5.20
Soybeans	1.27	2.10	1.30	3.20
Potatoes	11.89	20.00	15.50	30.00

1/ Korean Participation Plan for Title XII Program

2/ AID Loan Project

3/ Exceptionally low due to severe winter kill during winter of 1976-77

Table 11. Progress in the Selection for Earlier Maturity in Barley, Wheat & Rice

Crop	Current Status (1977)	Target
	Shorten season by	Shorten season by
Barley	4 - 5 days	10 - 15 days
Wheat	4 days	15 - 20 days
Rice	15 - 18 days	10 - 15 days

Table 12. Institutional Representation on Each of the Interdisciplinary Research Committees, 1978

Organization	Interdisciplinary Committee				
	Rice	Wheat/Barley	Soybean	Potato	Multiple Cropping
1. Research Bureau, ORD	3	2	1	1	3
2. Crop Experiment Station, ORD	2	1	2		4
3. Horticulture Res. Inst., ORD				2	
4. Tech. Dissemination Bureau, ORD	1	1	1	1	1
5. Institute of Agri. Engineering & Utilization, ORD				1	2
6. Youngnam Exp. Station, ORD	1	1			1
7. Honam Exp. Station, ORD	1	1			1
8. Agriculture Technology Institute, ORD	3	3	4	3	2
9. Alpine Exp. Station, ORD				1	
10. Ministry of Agriculture & Fisheries				1	
11. Office of Seed Production, MAF				1	
12. PORD				1	
13. College of Agriculture, SNU	3	1	4		2
14. Seoul College	1	1			
15. Atomic Energy Res. Institute			1		
16. Korea University				1	
17. Duksung Womens College				1	
18. Dongkuk University		1		1	
19. CIRC	3	2	2	1	2
20. Kyong Sang National College		3	1		

2. Barley

The original objectives for barley (Hordeum spp.) as set forth in the AID Crop Improvement Loan Book included increased yields (see Table 10), earlier maturity, cold hardiness, tolerance to poorly drained paddy soils, and improved resistance to insects and diseases.

The importance of barley as a unique component in the paddy rice/ barley multiple cropping system is reflected in the establishment of the Wheat/Barley Research Institute in 1977. The Barley/Wheat I.D. Team publications, "The Scope of Barley and Wheat Production, Use and Research in Korea, 1976/1978", discuss in detail the status of production of barley in Korea. Progress toward the breeding goals of winter hardiness, earliness and tolerance to poorly drained soils are discussed in detail in the 1978 issue of the Barley/Wheat-Scope report. Disease damage has caused significant annual yield losses in barley and yet there still exists a shortage of information on needed precise knowledge on pathogen race identification. New emphasis should be given to understanding the areas of root and stem diseases and virus diseases in Korea.

Though insect damage has not been considered to be of much economic significance, recent observations of sporadic but severe insect damage have been made. The expansion of barley/rice

double cropping system into the northern portions of the country will contribute to the overall goal of reaching self-sufficiency in food grain production. This emphasizes the problems of developing rice and barley varieties more compatible with each other in a production system. The urgent problem is to relieve the labor squeeze associated with barley/rice culture. This may be best accomplished by mechanization of both harvesting and planting for rice and barley.

The composition of the Barley/Wheat I.D. Committee is presented in Table 12. It should be emphasized again that the viability of this committee is critical to the attainment of efficient future progress. Thus cooperation and coordination of discipline and crop-oriented scientists is essential.

Barley varieties released by ORD during the lifetime of the Loan Program are as follows:

Table 13. Barley and Wheat Varieties Released since 1974.

Crop	Variety	Year Released
Covered Barley	Milyang 6	1974
" "	Bunong	1976
" "	Kangbori	1976
" "	Dongbori 1	1977
" "	Dongbori 2	1977
" "	Bangsa 6	1974
" "	Olmil	1976
" "	Jowang	1976

3. Wheat

The objectives as set forth by the AID Crop Improvement Loan Book for wheat (Triticum aestivum L.) included improved yields, earliness, improved milling quality, disease resistance, insect resistance, cold tolerance and tolerance to less well-drained paddy soils. The yield progress toward project goals of winter hardiness, earliness and tolerance to poorly drained soils is discussed in detail in the 1978 Scope Report for Barley/Wheat. Emphasis on accelerated research on wheat is a function of the establishment of the new Barley/Wheat Research Institute. The composition of the I. D. Committee is presented in Table 12. Detailed organization and research responsibility of the Barley/Wheat Institute is discussed in the Scope Report.

The present ORD objectives in wheat breeding are to develop new high yielding, lodging-resistant varieties which head 16-21 days earlier and mature 10-15 days earlier than the present commercial wheats. Newly developed lines and varieties do represent a significant increase in earliness with high yielding capability (10 days earlier heading and six days earlier maturity than the check commercial varieties). These new earlier-maturing varieties require a much higher degree of winter hardiness. Unless the latter

barrier is resolved, the earlier heading varieties may be restricted to the southern most areas of Korea.

Intensive effort still must be put forth on the development of improved grain quality in wheat. Due to the environmental conditions (high humidity) during maturity, the traditional high quality wheats produce poor quality grain due to the scab disease. The most severe disease problem is scab (Fusarium roseum f. sp. Graminearum or Gibberella zeae). As of now there are no known sources of genetic resistance. The current means of controlling this disease are through clean seed, proper field management and fungicides.

4. Soybeans

The AID Crop Improvement Loan Book set forth five research objectives which were also considered as high priority by the Soybean I. D. Committee. Foremost was the objective of developing new cultivars of soybeans (Glycine max L.) that would increase the present Crop Experiment Station research level from 1.98 MT/ha up to a level of 3.2 MT/ha within a 10 year period. Farmers' yields were expected to increase from 0.8 MT/ha up to 1.3 MT/ha. Table 10 shows that in 1977 the average farmer yield was 1.27 MT/ha, thus achieving the 10 year goal, but falling far short of the 3.20 MT/ha sought by the AID Loan Project for a research yield.

The soybean I.D. Team continues to recognize that major constraints to further yield increases are susceptibilities to disease pathogens and insect pests, notably, soybean mosaic virus, and/or soybean mosaic necrotic virus, soybean pod borer, and aphids as direct foliage feeders of soybeans or as vectors of virus diseases. Breeding programs have been successfully implemented to cover the other objectives stated in the loan book. These objectives all fall within the national soybean research requirements as set forth by the Soybean I.D. Team report entitled: "The Scope of Soybean Production, Use, and Research in Korea," in 1976.

The composition of the soybean I.D. Team is listed in Table 12. Historically, research funds made available for soybean research were primarily used in the CES soybean breeding program in ORD. The CIRC program initiated a broader scale of research involving the pathologists and entomologists of the ORD Agricultural Technical Institute and of various other soybean scientists in colleges of agriculture. This has evolved into an interdisciplinary research effort. Currently soybean breeding for cultivars adapted to an upland barley/soybean production system has been started at the Milyang Crop Experiment Station.

One of the greatest constraints to an effective soybean research program has been the shortage of research personnel and

an adequate research budget to carry out both breeding and plant protection research. ORD has recognized this, and has recently begun to increase the number of staff assigned to the Upland Crops Research Division where soybeans are a major effort. Future successes in the improvement of soybean production will be very dependent upon the allocation of research funds to the entomology, plant pathology and soil microbiology efforts within the Institute of Agricultural Sciences. The research efforts there must be cooperative with the breeding program so that screening and selection techniques can be efficiently carried out.

Special effort should be made to assure that all yield trials and research plots are fertilized and treated according to continuing soil test recommendations. Much soil variability has been observed at Suweon and other yield trial sites. Effective breeding and selection programs can only be carried out under relatively uniform soil conditions.

Potatoes

The potato (Solanum tuberosum L.) is not yet a major food crop in Korea, although it is estimated that over 40 percent of Korean farmers grow potatoes. Most are grown in small fields or as a few rows of potatoes in gardens, but it is expected to be a key crop in efforts to reduce reliance on cereal crops and importation

of food grains. The potato, a short season crop of 80-120 days, is adaptable to diverse environments and fits well into many cropping systems designed to maximize land utilization.

The production goals for potato were not set forth in the AID Crop Improvement Loan Book. The Potato I. D. team was to emphasize cultural practice improvement, variety trials, production of clean seed stocks, and studies on storage and processing. In the early period of the loan program, the decision was made to emphasize potatoes on the same scale as other crops in the program. The production goals subsequently established are shown in Table 10. The average farm yield in 1972 (Potato Scope report) was 10.6 MT per ha. The average yield in 1977 was 11.9 and the goal for 1980 is 15.5. Though it appears that the goals for 1980 will not be achieved fully, these results are directly influenced by the following constraints:

1. Doubling or tripling the supply of certified seed potatoes in Korea since, at present, there is only enough certified seed available for approximately one-fourth of the total potato production area.
2. Incorporation of more virus and late blight resistance into new varieties.
3. Release of earlier cultivars for multiple cropping before paddy.

4. Expansion of regional yield-trial testing to include variety trials for cultivars adapted to paddy production and to autumn production.

The major constraint to increased production appears to be the quality of seed planted. Seedborne diseases are the primary reason Korea spends a disproportionate amount of their research funds on production of clean seed potatoes. Inappropriate cultural practices, soil borne pathogens, nematodes, drought, low soil fertility, storage losses and lack of mechanization also affect production costs and returns per unit area.

ORD has evidenced its oommitment to future potato production through the establishment of a potato research division in the Horticulture Experiment Station in 1977. The Potato I. D. Team functions as a committee under the Research Bureau and is primarily responsible for identification of production and/or research constraints which limit crop productivity, for assessment of research priorities essential to the accomplishment of increased production, and for promotion of improved interaction and cooperation among scientists in various administrative units within ORD and collaborating organizations. Thus discipline-oriented scientists must continue to cooperate with the crop-oriented scientists for continued efficient progress in the future.

As of 1978, the Potato I. D. Committee was composed of representatives from the organizations indicated in Table 12.

B. Cropping Systems

The objectives of the Cropping Systems project, detailed in the AID Crop Improvement Loan Book, may be stated briefly as follows:

1) Develop land use and cultural practice recommendations for rice, barley, wheat, soybeans and potatoes and crop combinations with special reference to idle winter paddy.
2) Provide policy makers with agroeconomic information relative to food and feed production potentials under alternative multiple-cropping systems.
3) Direct research efforts towards soil fertility, soil physics, water management, agricultural engineering, conservation and the economic and sociological aspects of multiple-cropping systems.

There is no organizational entity within ORD for cropping systems. There has been discussion regarding the creation of a section within the Research Bureau or a division within the Crops Research Station for this. The Interdisciplinary Committee for Cropping Systems, because of the nature of the project, is very diverse. (See Table 12.) Because of its size and diverse nature,

the IDC was unusually clumsy and, perhaps, less effective than those of the individual crops research projects.

The fact that no administrative division or section existed for the management of the multiple cropping activity resulted in rather cumbersome funding procedures. It is not possible to simply fund a field experiment in multiple cropping directly since funds now must be divided among the various agencies and departments concerned.

Multiple cropping has been practiced in Korea since ancient times and has increasingly grown in importance during recent years as a means of increasing total agricultural productivity. The population of the Republic of Korea now stands at 35.9 millions with a population density of 362.9 per square kilometer and 16 per hectare of agricultural land (1). The rural population has been decreasing as industrialization progresses so that only 35.7 percent of the population now lives on farms. This has permitted an increase in the average size of the farm, which now approaches one hectare. The need to produce more food per unit of land is becoming more and more urgent.

The utilization of agricultural land is already quite intensive, as is shown in Table 14, although there has been some decrease as a result of more land going into perennial crops. Multiple cropping practices in use in paddy and upland areas are shown in Fig. 3 and

Fig 4 respectively. Nevertheless, more than 60% of the agricultural land, or some 1,383,000 ha, are not being multiple-cropped.

Among the factors affecting the success of multiple-cropping are water management, including drainage, irrigation, and salinity; availability of labor; climate, with special emphasis on the length of the frost-free season; availability of markets; availability of capital; and, the personal inclination of the farmer himself. Fig. 5 demonstrates the importance of climate in determining the distribution of multiple cropping in Korea.

Multiple cropping is obviously an interdisciplinary activity drawing upon the expertise of a number of specialties including those of the agricultural economist, plant breeder, pathologist, entomologist, physiologist, soil fertility specialist, agronomist, water management specialist, and agricultural engineer. Of primary importance has been the development of short season, cold tolerant, and saline tolerant varieties that can be fitted together in cropping systems in various parts of the country. The intensive use of vinyl plastic as protection against frost and for mulching, and the trend towards mechanization have greatly improved the possibilities for the fitting together of crop combinations.

The development of the short season, cold tolerant Tongil rice varieties has had an important effect on the multiple cropping of paddy lands. The barley-rice combination provides a substantial

increase in the total production of grain but the cost of production and low price of barley make the economics of the operation appear questionable unless the farmer intends to use barley as food. Similarly, the Irish potato-rice combination is quite successful and profitable, but the potatoes must be harvested in early June when prices are unfavorable and the rainy conditions make storage difficult. However, these problems are being worked on by ORD and cooperative storage facilities for potatoes are being planned. Combinations of miscellaneous vegetables with rice work well. Wheat has not performed well in combination with rice but has displayed some success in the uplands.

CIRC has contributed to the multiple cropping studies of ORD by assisting in the organization of agronomic and economic studies of various practices and the testing of varieties for these purposes in several climatic zones of the country.

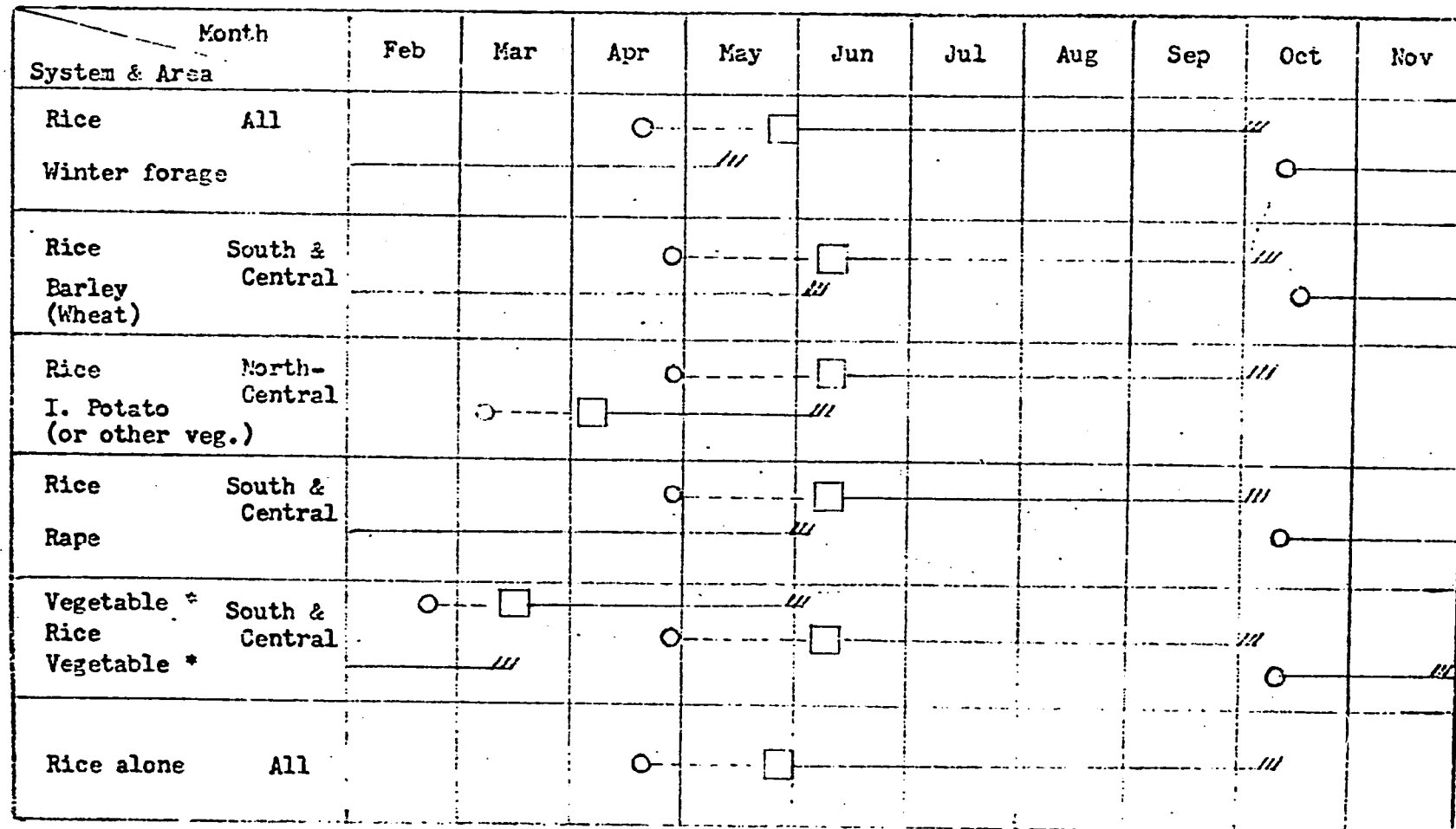
Twenty-seven experiments on cropping systems and land utilization improvement, ten of which were financed by CIRC, were conducted during 1977. Profitable combinations of potatoes and rice, and rye forage and rice have been demonstrated in paddies. In upland cultivations, potato-sweetcorn-soybean, sweetcorn-soybean and sweetcorn-potato have proved profitable. An economic survey of multiple cropping on paddy in the north and central regions, a

Table 14. Utilization of Cultivated Land in Korea 1/

Year	Area of Cultivated Land (Ha)	Utilization of Cultivated Land (Ha)	Percent Utilization
1967	2,311,921.3	3,283,469.0	142.0
1968	2,318,776.0	3,301,441.6	142.4
1969	2,311,169.5	3,337,283.7	144.4
1970	2,297,517.9	3,263,862.4	142.1
1971	2,271,307.3	3,100,251.6	136.5
1972	2,242,290.4	3,076,107.1	137.2
1973	2,241,252.8	3,048,896.8	136.0
1974	2,238,431.9	3,122,569.1	139.5
1975	2,239,691.5	3,166,018.4	141.4
1976	2,238,218.7	3,092,797.3	138.2

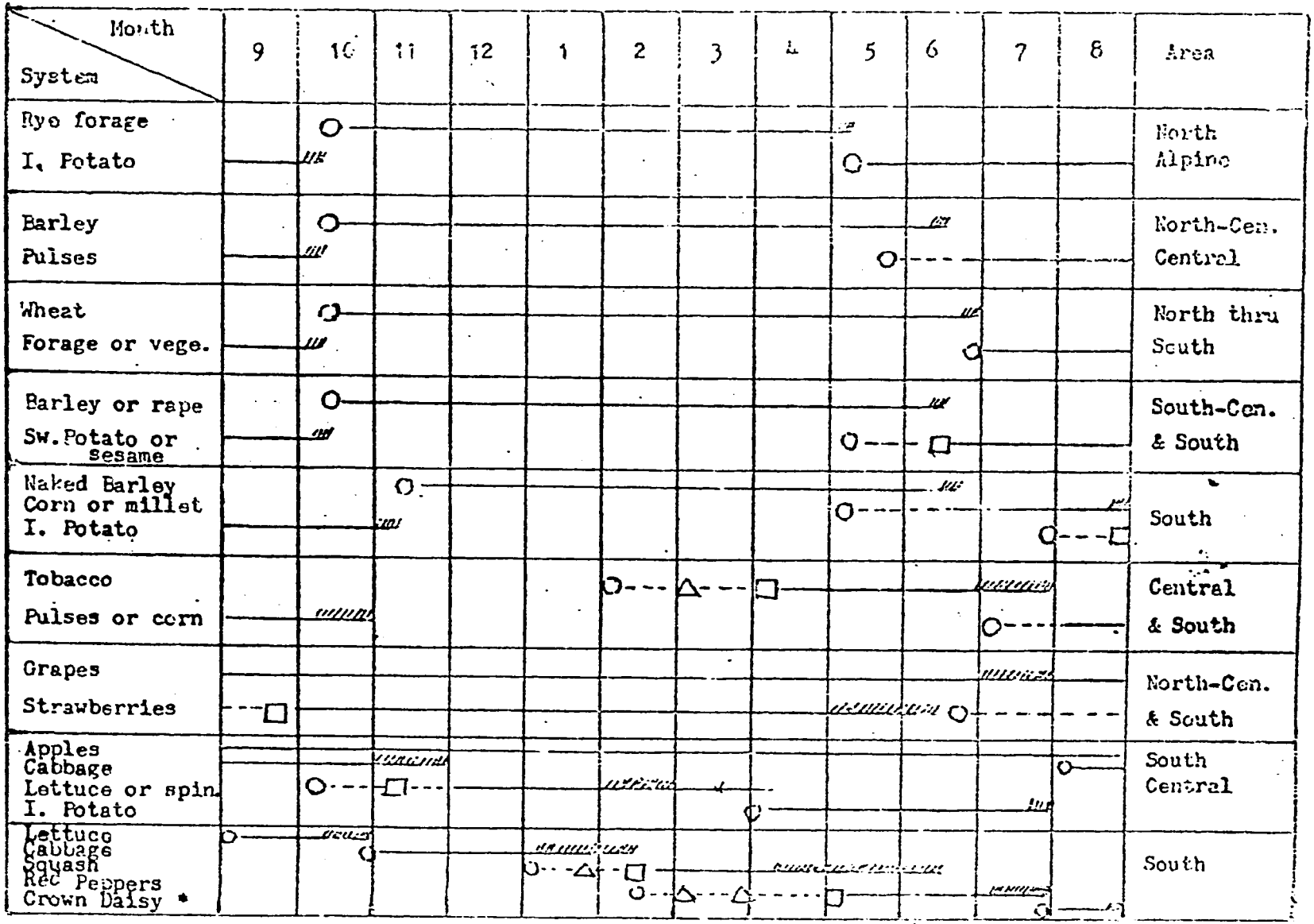
1/ Yearbook of Agriculture and Forestry Statistics, 1977. Min. Agric. & Fish., Republic of Korea.

Fig. 1 Schemes of Some Common Pado, Cropping Systems in Korea.

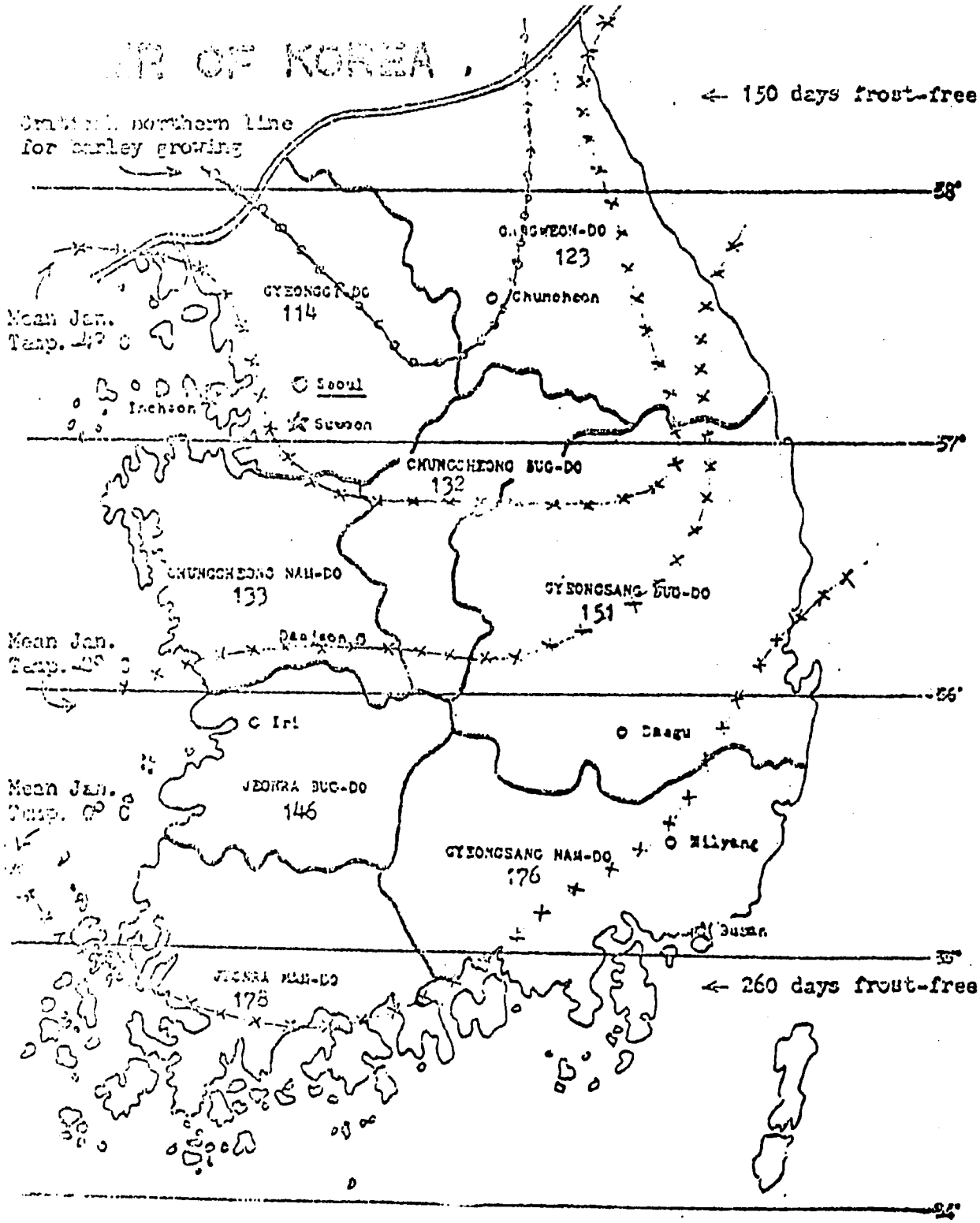


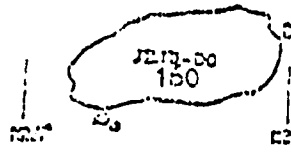
* Vegetables include spinach, lettuce, cabbage, peas, melons, radish, misc. greens, etc.

Fig. 2 Schemes of Some Common Upland Cropping Systems in South Korea.



* Crown Daisy (Chrysanthemum coronarium L.,) is a green for soup/salad.





*Figures under province names are total cultivated land utilization rates. Statistics of Ministry of Agriculture & Fisheries, 1975.

national study of multiple cropping systems, and the first volume of a review of pertinent literature on multiple croping in north temperate zones have been completed. ORD publishes a bulletin on alternative multiple cropping systems for all parts of the country, updated annually, which is used by extension personnel in advising farmers on the preparation of their farm plans.

Future multiple cropping activities will also have to focus on the production of green manure for livestock and soil improvement. Prior to the acceptance of the present loan project on varietal improvement, the KASS (Korean Agricultural Sector Study) study also recommended irrigation and livestock programs. The irrigation program was implemented, but there were insufficient funds for livestock.

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(1) Yearbook of Agricultural and Forestry Statistics, 1977. Min. Agr. Fis., Republic of Korea

C. Support Activities

1. ORD Centralized Library Service Facility

The ORD library is a service facility within ORD which has no firm direction or mandate within ORD for maintaining its competence or usefulness to the researchers and other clientele of ORD. The library is the backbone of knowledge exchange within ORD.

At the present time, the Director of the library holds diverse positions of authority which dissipates his ability to maintain a viable library facility. The librarian holds a 4A government position, which in turn reflects the low level of management authority which the professional librarian holds.

One of the procurement goals of the Crop Improvement Research Loan was to insure that ORD researchers would have adequate library facilities.

A special effort was made at ORD to purchase through loan funds new reference books, basic and applied journals not presently available, replacement of missing journal volumes, and equipment which is critical for the operation of library activities. In the past, due to the lack of a strong central library policy, the library collection had not been maintained or improved. As a result of this weak library policy, the number of persons using the facility had been decreasing year by year. Furthermore, this recent infusion of new books, journals, equipment, etc. can only be considered as a temporary solution and does not alleviate any of the present, inherent management problems.

The recommended solution for the centralization of support activities in developing an excellent library system is discussed at the end of Recommendation V.

2. Computer and Statistical Services Facility

There are two major problems associated with the biometrics capability of ORD. These are a) failure of many researchers to apply appropriate experimental design techniques, and b) lack of a statistical servicing unit. Previous problems associated with slow computer turn around time along with staff and computer limitations are being resolved with the purchase of the Digital Equipment Corporation PDP 11/70 unit. This unit will fulfill all of the recommendations made by the computer system consultant, Dr. Jerry Warren, in July, 1977. This unit will also allow for rapid and excellent data processing requested by the Biometrical Serving Unit, by the individual research units, and other units within ORD.

Two remaining problems emphasize the need for biometrical servicing requirements in ORD. This service should review all experimental plans and lay-out of approved experiments. The biometric reviewer of the experimental design should also be responsible for assisting the researcher in analyzing the data and interpreting the results. For the most expeditious use of the statistical assistance, and of the computer, there must be a direct link between the researcher and the service unit. Results should be returned directly to the researcher and not passed through administrative channels.

3. Centralized Laboratory Facility for Service and Analysis

The AID Crop Improvement Loan Project Book called for the establishment in ORD of a centralized laboratory equipped to conduct large scale routine analyses for several research entities within ORD. CIRC hired a laboratory consultant to assist in the planning and design of such a centralized laboratory. In 1977 funds were set aside from the CIRC Won Budget for the remodelling of an existing brick structure for the centralized laboratory facility. Equipment based upon the lab consultant's recommendation has been ordered and should be in place by late 1978.

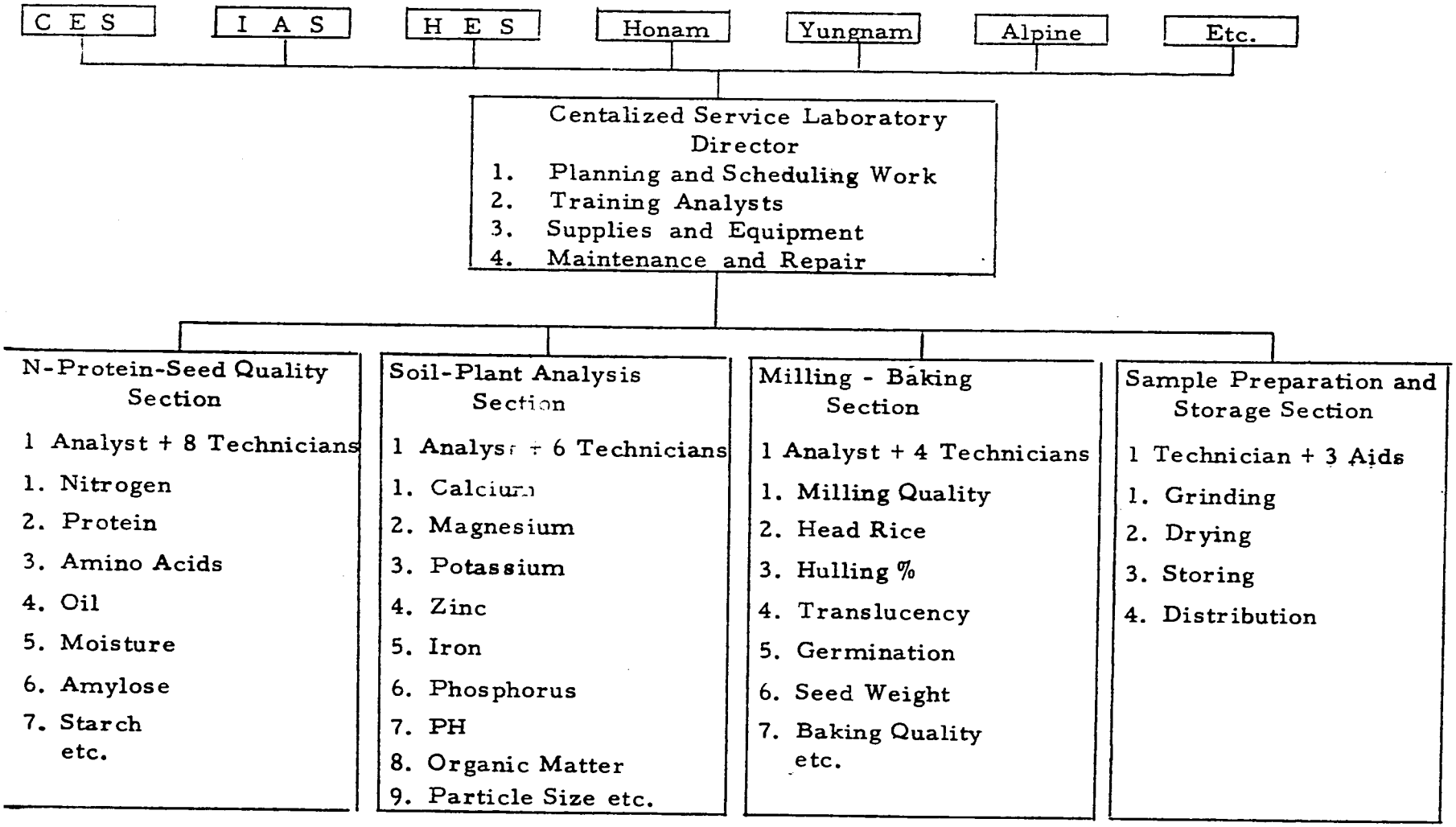
This centralized laboratory will be equipped and staffed to provide rapid, routine analysis of data needed by ORD scientists to supplement their field work. Much, if not all, of the duplication in the present analytical work will be eliminated by this unit. This service facility will allow data collected from many locations and researchers to be compared confidently without fear of analytical differences affecting their interpretation. A schematic diagram of the laboratory and its functions is presented in Fib. 6.

The Director of the Centralized Laboratory Facilities will be the first Ph. D graduate under the CIRC training program. This is Dr. Lee Young-seok who received his Ph. D in soil science from the University of Vermont in 1977.

The various activities carried out in support of research services are now scattered in different offices and institutes under

diverse management. These individual activities as well as the research services of various facilities listed above would benefit greatly by being centralized under one single office. The office of the Deputy Director General would appear as the best possible and most logical choice.

Fig. 6. Organization of the Centralized Laboratory Facility for Service and Analysis



III. GENERAL CONSTRAINTS TO THE EFFECTIVENESS OF ORD

A. General Conditions

1. Personnel

Without doubt, the late arrival of key personnel resulted in delays in the accomplishment of the objectives of the project. As can be seen in Table 15, the man-months of long-term personnel services fell considerably short of the specifications in the original plan.

Early in the project, a decision was reached not to include the 174 man/mo. of services listed under the category of "other" in the original plan as shown in Table 15. The remaining time shortfall is due to the fact it took up to eighteen months for initial staff recruitment, rather than the six months as originally planned. This was in part due to the nine month period spent in recruiting the Co-Director. The rice and soybean staff fell short in that they were recruited by other programs at the end of their first two-year tours in Korea.

Aside from this, the long-term staff has been very efficient and has catalyzed the effectiveness of the Interdisciplinary Research Committees (See Table 16).

2. Training

As indicated in Table 17, there was also a delay in sending candidates for overseas training. However, the granting

of an extension of the loan terminal disbursement date (TDD) to 30 September, 1980 will enable the advanced degree students whose departure was delayed to complete their training. All of the training planned under the loan will have been completed by this terminal disbursement date.

3. Procurement

Table 18 summarizes the procurement of research equipment, research materials, and library books, publications and equipment. It is anticipated that all items will have been purchased, installed and paid for by the TDD of July 28, 1979 for the other components under the loan.

Table 15. Long-term Personnel

Item	Original Plan		Accomplished*	
	Persons	Month	Persons	Month
Co-Director	1	58	2	45
Team Leader	4	216	5	174
Rice	(1)	(54)	(1)	(25)
Barley/Wheat	(1)	(54)	(1)	(48)
Soybeans	(1)	(54)	(1)	(27)
Potato**			(1)	(24)
Crop Systems	(1)	(54)	(1)	(50)
Biometrician	1	48	1	36
Entomologist	1	48	1	6
Agr. Economist**	1	24	1	20
Other(Physiologist, Farm Mechanist Agronomist)	4	174	-	-
Total	12	568	10	281

* Includes 1978 and 1979

** Originally short-term consultants but changed to long-term experts

Table 16. CIRC Staffing Pattern

Names	Position	Date of Arrival	Contract Termination
Dr. O. J. Kelley	Co-Director	Sept. 8, 1974	Sept. 8, 1976
Dr. J. M. Yohe	Acting Co-Director, Soybean	April 12, 1975	July 6, 1977
Dr. R. L. Beacher	Cropping Systems	Feb. 8, 1975	Feb. 8, 1979
Dr. W. L. McProud	Barley/Wheat	April 2, 1975	April 1, 1979
Mr. M. D. Davis	Rice	July 27, 1975	Sept. 7, 1977
Dr. D. Neeley	Biometrician	Oct. 1, 1975	Oct. 1, 1977
Dr. J. D. Franckowiak	Potatoes	Sept. 11, 1976	Sept. 10, 1978
Dr. P. C. Lippold*	Entomologist	Jan. 1, 1977	May 31, 1979
Mr. D. O. Diltz	Economist	April 15, 1977	April 14, 1979

* Present Co-Director

Table 17. Overseas Training as of January, 1978

Discipline	Ph. D.			M. S.			Short-term Training & Refresher			Conference & Observation			Total		
	Plan	Result	+ -	Plan	Result	+ -	Plan	Result	+ -	Plan	Result	+ -	Plan	Result	+ -
Rice	6	5	1	4	2	2	17	4	13				27	11	16
Barley/Wheat	2	1	1	6	4	2	15	4	11				23	9	14
Soybean	3	3	0	3	3	0	9	2	7				15	8	7
Potato	3	3	0	1	0	1	8	4	4				12	7	5
Cropping System	5	5	0	4	3	1	10	5	5				19	13	6
Research Support	3	3	0	0	0	0	28	4	24				31	7	24
Conference & Observation										44	29	15			
Total	22	20	2	18	12	6	87	23	64	44	29	15	171	84	87

Table 18. Procurement of Research Equipment

Unit: $1,000

	Original	4th Steering Committee Meeting	Proposed Plan	Remarks
Lab. Equipment	679	1,160	1,600.5	
Central Lab		230	425	Under process at OSROK
Farm Machinery Work Shop		70	70	"
Wheat/Barley Institute		140	140	"
Out-reach Stations		520	725.5	"
Computer		200	240	"
Research Materials	412	73	36.5	Under process at IIE
Library	400	400	288	
Library Equipment		60	88	Under process at OSROK
Books		340	200	Under process at IIE (100) List under review (100)
Total	1,491	1,633	1,925	

4. Disbursement

The disbursement of dollar funds is presented in Table 19 along with the disbursement of the complementary won funds in table 20. The original loan agreement was signed on January 28, 1974.

The project Co-Director did not join the program until September 8, 1974. The first long-term Consultant did not arrive until February 8, 1975 (Table 16). The rice team leader arrived on July 27, 1975. Thus, more than 18 months transpired before an extensive working nucleus was established. It was subsequent to this date that the planning for training, consultants and procurement was finally effectively initiated. Due to the delay in the arrival of consultants, it was necessary to omit some long-term positions. It became apparent then that the foreign expert budget could not be completely expended as planned, so funds were reallocated for training and equipment purchases.

This alternative was necessary because of inflationary increases in the cost of training and in the price of equipment and materials - a factor of 30-40% during the period of January 1974 June 1977. All equipment purchases under the dollar budget were either recommended by the long-term experts or short-term consultants for special projects, such as the Centralized Laboratory,

Computer Service Activity or the Library. However, all funds will be successfully expanded by the Loan Terminal Disbursement Date (TDD) of July 28, 1978 for contract services, commodities and laboratory research equipment and the TDD of September 30, 1980 for training.

In reference to the ORD counterpart budget funds, won were expended as planned except for the reallocation between salaries for supplementary personnel, research work and research facility expenditures. Due to significant salary increases approved by the Government, there was no room in the salary budget to absorb this overage. Funds were therefore reallocated from the research budget. There were also facility needs unforeseen at the onset of the project. This increased requirement was also met through reallocations from the research budget. The decrease in the research budget was not critical since the regular ORD research budget was increasing at an accelerated rate during the same period of time. All in all, the program for the expenditure of counterpart won funds was successfully carried out as scheduled.

Table 19. ORD Loan Budget Funds

Project	'74 Orig.	'74 Res.	'75 Orig.	'75 Res.	'76 Orig.	'76 Res.	'77 Orig.	'77 Res.	'78 Orig.	'78 Plan	'79 and after Plan	Total Original	Total Change
1. Contract Services	132	25	522	174	562	257	562	370	462	400	- 80	2,240	1,306
Long-term experts	130	25	450	174	450	225	450	250	390	240	- 80	1,870	994
Short-term consultants	2	-	72	-	112	32	112	120	72	160	- -	370	312
2. Training	32	-	313	52	408	113	324	191	182	737	- 500	1,259	1,593
Degree training	-	-	171	13	266	57	209	100	85	385	- 500	731	1,055
Short-term training	-	-	110	21	110	6	83	72	65	287	- -	368	368
Conference/ observation	32	-	32	18	32	50	32	19	32	65	- -	160	152
3. Research Equipment & Materials	600	-	400	-	339	23	102	20	50	1,882	- -	1,491	1,925
Res. Literature/ books	100	-	100	-	100	-	50	-	50	288	- -	400	288
Equipment/ instruments	200	-	100	-	60	-	52	20	-	1,558	- -	412	1,578
Res. Materials	300	-	200	-	179	23	-	-	-	36	- -	679	59

Table 19. ORD Loan Budget Funds (Cont'd)

Project	'74 Orig.	'74 Res.	'75 Orig.	'75 Res.	'76 Orig.	'76 Res.	'77 Orig.	'77 Res.	'78 Orig.	'78 Plan	'79 and after Plan	Total Original	Total Chang
4. Other	2	-	2	12	2	17	2	30	2	87	- 30	10	176
Administrative fees for IIE	-	-	-	9	-	17	-	30	-	65	- 30	-	151
Bank Service Charges	-	-	-	3	-	-	-	-	-	2	- -	-	5
Reserve fund	2	-	2	-	2	-	2	-	2	20	- -	10	20
Total	866	25	1,237	238	1,311	410	990	611	696	3,106	- 610	5,000	5,000

Table 20. ORD Counterpart Budget Funds

Unit: ₩1,000,000

Project	'74		'75		'76		'77		'78		Total	
	Orig.	Res.	Orig.	Res.	Orig.	Res.	Orig.	Res.	Orig.	Res.	Orig.	Res.
Salary for supplementary personnel	23	5	66	40	83	84	83	134	83	170	388	433
Research programs	101	49	140	70	140	98	140	69	140	58	661	344
Research facilities	63	33	42	77	30	107	34	93	31	60	200	370
Tuition for foreign children	1	1	6	-	6	-	6	-	5	-	24	1
Housing for foreigners	4	37	33	90	33	10	33	12	33	15	136	164
Operation of CIRC	48	29	30	56	30	30	30	32	30	120	168	167
Customs Clearance	10	-	1	-	1	4	1	1	1	60	14	65
Interest			8	1	16	5	24	9	32	35	80	50
Total	250	154	326	334	339	338	351	350	355	418	1,621	1,594

B. Constraints

Personnel System

Salaries paid to research personnel of ORD are significantly lower than those paid to university staff of comparable status as shown in Table 21. In addition, the possibility of promotion within ORD is less favorable since, of the seven grade levels in ORD, only the three lowest levels may be held without the assumption of administrative duties. The four highest grades are management positions. This means the time of the research scientist is inevitably going to be taken up with administrative duties if he is promoted. A ceiling is also imposed on the grade and salary to which one may expect to rise, since the number of available management positions: Station Director, Division Chief, etc., are relatively scarce. A lack of continuity in the progress of research may result from the promotion of a key research staff member to a management position. This is especially so if this moves the individual to a post outside of his own area of specialty. The current status in the field of research applies equally well to the extension arm of ORD. The ORD system is definitely oriented towards management.

This situation results in a serious drain on technically trained personnel, since these people depart to seek more favorable employment opportunities in universities and private industry. While it may be true, as is frequently pointed out, that those who depart

are still making a contribution of some kind to the country, the contribution made is certainly not the one intended when their training was financed by ORD.

It is imperative for the long-term development of the ORD Service that conditions of employment be such that a young scientist may look forward with reasonable confidence to a rewarding and renumerative career in research. During this time, he should reasonably expect to rise to a high level in grade and salary as a result of his productive research, without the need of becoming over-involved in management.

Table 21. Comparison of ORD and University Personnel Grades and Salary Scales

a. ORD Annual Salaries (Won)

($1 = 480 Won)

Grade	Salary Range		
1			4,182,000
2A	3,078,000	-	3,342,000
2B	2,532,000	-	2,796,000
3A	1,332,000	-	2,196,000
3B	1,338,000	-	1,602,000
4A	954,000	-	1,146,000
4B	702,000	-	894,000

b. University Annual Salaries, Plus Allowances (Won)

Grade	Salary Range		
Professor	5,040,000	-	5,316,000
Associate Professor	4,716,000	-	4,956,000
Assistant Professor	3,888,000	-	4,428,000
Instructor	3,048,000	-	3,528,000
Assistant	2,268,000	-	3,336,000

In order to reduce this drain and encourage the development of a career research service with depth and experience, it will be necessary to: 1) improve the salaries so that they are competitive with those of the universities and, 2) revise the personnel system to provide two parallel ladders for advancement, one for research and another for management.

2. English Language Training and Selection of Personnel for Advanced Training Abroad

English language competence among Koreans is inadequate at the present time. This is true despite the close contact between United States and Korea during the past 30 years. The lack of English competence has imposed a serious limitation on the selection of candidates to be sent abroad for advanced training.

In addition, it handicaps research people in their professional activities, since the bulk of scientific literature is in English. The reasons for this lack of English ability among technical people are due to the fact that: 1) Korean schools do not begin teaching English earlier than Junior High School level; and, 2) there is no consistent and well-organized effort to arrange for English instruction.

The selection of personnel for advanced training abroad has been complicated by the difficulty of identifying suitable candidates with English language capability. There is also reluctance on the part of some supervisors to release good people since they are considered essential for the successful accomplishment of a given task. In addition, a certain amount of rivalry exists, with a tendency towards empire building among various experiment stations and institutes, which adversely affects the selection of candidates.

CIRC should be commended for having established an intensive English course, staffed by Peace Corps Volunteers and Korean English instructors, to prepare candidates for advanced training in the U.S. This, however, has only been a short-term solution to a long-term critical need.

Since English is the biggest hurdle the candidate must overcome in order to undertake advanced training in the U.S., and since it is also of enormous importance to his future success, training in the language would appear to be a matter which merits

the fullest attention of ORD. Training, using the most modern methods, should be provided well in advance of scheduled departure and there should be no question regarding the release of candidates for this purpose by their superiors. The introduction of English at the earliest grades in primary school would, of course, be most desirable.

ORD now operates a language laboratory staffed with Peace Corps Volunteers which offers an intensive eight-week English course for personnel scheduled for overseas training. An additional follow-up course is available if needed. Staff members are relieved of their duties in the field in order to take this course, a measure which frequently meets with resistance by the individual's supervisor. Some supervisors want the candidate to continue with his regular full work load while taking the course. The time and effort expended by the student is the most critical factor in learning a new language.

A policy requiring all new personnel to take the eight-week course as part of their indoctrination to ORD prior to being permanently assigned would avoid in part this problem while assuring that all personnel receive English training. An advanced refresher course could then be given to personnel just prior to departure for advanced training.

The staffing of the language laboratory by Peace Corps Volunteers is necessarily only a temporary measure, and steps must be taken very soon to provide Korean staff for this facility. The long-term solution to this problem lies in ORD adopting a high-priority policy for English language training.

3. Shortage of Subject Matter Specialists

Plant pathologists and entomologists are in short supply at ORD, and there is little depth in the staffing of these specialities. The importance of disease and insect control and the need for these specialists to serve on various interdisciplinary teams argues that measures must be taken to build up their strength.

An excellent service has been created for the forecasting of insect infestations on rice, but nothing of that sort has been developed for other crops, either in entomology or pathology. Snyder (19) mentioned a whole gamut of diseases, especially many soil-borne pathogens, which can be expected to become serious problems in the future. He also refered to numerous diseases for which the causal organisms have not yet been identified. Clearly there is a need for an intensification of work in the fields of pathology and entomology. This, in turn, will require an increase in professional staff.

Additionally, many other subject matter fields such as weed control, bacteriology, systematic entomology, etc. must be added in the future. Such disciplines would add considerable depth to ORD research capabilities.

4. Research Library

A comprehensive and up-to-date library is essential to the success of a research organization. ORD has a fairly good library and funds provided by CIRC will correct many present shortcomings. The ORD library facility has suffered during recent years from the fact that funds which had been earmarked for the library were being transferred to other departments of ORD. As a result of this reallocation, few new books or journals were purchased.

The institutes and experiment stations maintain small independent libraries containing materials of special interest. The central library has no information regarding the content of these small libraries, and is not in a position to refer to this material when requests are being made. A wider array of journal acquisition could be made from available funds were the central library able to know which of the requested journals were already being received by one of the smaller institute libraries.

Some means must be found to assure the integrity of the ORD library's budget and to avoid it being used as an emergency

fund for other departments. Close coordination must be worked out among the various ORD libraries to compile information on all existing accessions to be readily available at the central library facility. Perhaps computerization of this information using the ORD facility would simplify matters and greatly increase the efficiency of the library system. Due to the increasing cost of books and periodicals, duplication should be reduced to a reasonable level, and microfilmed or microfiche material should be used where feasible.

5. Maintenance of Equipment

The maintenance of laboratory equipment appears to pose a problem, with expensive pieces of equipment being disabled and repairs being inconvenient as well as expensive. Clearly a program for the maintenance of equipment is needed. Supplies of spare parts, for Japanese and American equipment, are also required.

A maintenance contract is being negotiated for the new computer now on order. The use of maintenance contracts for the more complicated and expensive equipment is hereby suggested as a means of avoiding costly down-time.

A procedure for surveying obsolete and damaged equipment should be developed in order to avoid having these items permanently on the inventory. Furthermore, obsolete or damaged equipment at one facility might be repaired and used at another facility. A log with this information should then be circulated among various departments and institutes.

IV. FUTURE INTERNATIONAL COOPERATION

A. Introduction

In all likelihood foreign assistance to Korea will be terminating in the near future. Progress, through international cooperation, has advanced the status of the country from one of total devastation in the aftermath of the Korean War to that of a nearly fully developed nation. The time has now come for a change in roles, from an aid receipient to that of an aid donor. This should be envisaged as the future role for Korea.

In spite of considerable agricultural advances, the country is not yet self-sufficient in most areas of food production. In this regard, Korea must strive for continued cooperative research with other countries around the world in order to solve these food problems. However, Korea has also many strengths and areas of expertise which should be shared with other nations in order to enable these to overcome some of the very same problems which were successfully solved here during the past generation.

It is with this idea of developing future mutually beneficial cooperative networks that the following section is presented. The status of present ORD/international cooperation is presented in Table 21, 22 and 23.

Table 21. Current ORD/CIRC Cooperative Programs

Institution	Location	Cooperative Programs
IRRI	Philippines	Improvement of rice variety; seed multiplication; joint research.
CIMMYT	Mexico	Development of early maturing superior wheat varieties.
INTSOY	U.S.A.	Development of soybeans improved varieties and production.
CIP	Peru	Research on techniques for potato culture.
AVRDC	Taiwan	Joint research on vegetables; potatos; soybeans.
Korea-Japan Joint Research Project	ORD/Korea	Joint research; mutual exchange of scientists for training
Korea-U.K. Joint Research Project		Development of farm machinery and rural fuel resources.
Korea-Germany Joint Research Project		Research and development of grasslands
ORD-Missouri Tech. Coop. Project		Training of researchers; invitation of specialists; joint research.

Table 22. Visits by Foreign Scientists to ORD

Year	'74	'75	'76	'77
No. of Visitors	96	197	546	790

Table 23. Major Foreign Assistance

Project	Assisting Agency	Period	Amount ($1000)	Type of Assistance
Soil Survey and Fertility	UNDP	'64-'69	1,732	Grant
		'71-'74	346	"
Strengthening Plant Portection and Training	"	'71-'77	1,266	"
Crop Improvement Research Project	AID	'74-'78	5,000	Loan

B. Need for Continuing International Programs

1. Termination of Major Foreign Assistance

The major grant assistance provided to ORD over the past twelve years by the United Nations Development Programme terminated in 1977. The current AID Loan is scheduled to terminate on September 30, 1980. No further major external assistance is presently anticipated by ORD.

2. Continuing Requirements

Past associations and current cooperative programs were chiefly responsible for advances in agricultural production. The changing status of Korea from a developmental standpoint must not signal an end to future participation in international cooperation. This established channel which ensured present successes must now become a two-way exchange of scientific information in order to support continued progress.

Without a doubt, ORD will continue to need external linkages in order to remain a high quality research institution through staff training, consultants and cooperative research projects on major constraint areas in Korean agriculture.

One of the possible ways ORD could continue participating in international agricultural programs is through Title XII of the U.S. Foreign Assistance Act which calls for increased and

longer term support for the application of science to solving food and nutrition problems of the developing countries.

C. Possible Title XII Participation

1. Areas Requiring Further External Support

Additional work and support is required in the following areas in order to enable ORD to continue working towards food self-sufficiency in Korea:

a. Livestock production was identified by KASS (Korean Agricultural Sector Study) in 1970 as one of the three major areas needing improvement. The remaining two areas were crop improvement and irrigation. The latter two were recipients of $5,000,000 loans each. There were, however, insufficient funds to support the livestock program. This program should receive future consideration, particularly with regard to: small ruminants, animal nutrition, grassland management, and control of animal diseases.

b. Small farm mechanization is regarded as the second most important priority. The rapid decrease in the farm population (less than 36% of the total population) and the still extensive requirements for agricultural hand-labor call for an urgent solution to this problem. Small farm mechanization must be developed in order to alleviate the labor problem along with the development of mechanized cropping systems as practiced in the United States and Japan.

c. Potato production is considered the third priority. The potential food value of this crop and its adaptibility to the many hilly, upland, sandy and polder areas of the country require concentrated efforts on this crop. Specifically, areas requiring attention include: breeding and cultivation practices, seed potato production, storage, and control of potato diseases.

d. Plant protection for upland crops has received little attention to date. The major emphasis had been placed on paddy, with resultant self-sufficiency in rice. As a result, however, problems with upland crops have been virtually ignored. Efforts in this area must now focus on: identification of pests and diseases, biological control, and the development of inegrated control methods.

e. Soil conservation is a significant area requiring further study. Given the limitation of restricted crop lands, less than 23% of the total area, it is imperative that most efficient utilization and conservation of available arable land be attained. In this regard, there must be more extensive studies on erosion control and more efficient water utilization.

f. Rural extension is one of Korea's strongest programs which has much to offer to the other regions in the world. As successful as the program has been in the past, there are still some facets which require improvement. Foremost of these is the need for more extensive training of extension agents

in methodology as currently employed in the United States. This aspect should further improve the efficiency of the service. Additional training of personnel is also required in specific areas of specialization. This type of updating, and possibilities of replication to Korean agriculture, would have maximum impact on improving and increasing the efficiency of the extension service.

2. Specific Assistance Requirements

The type of support required in each of the above areas includes: 1) development of joint research, 2) visits by foreign consultants, 3) training of ORD staff abroad, 4) reinforcement and improvement in some research equipment and facilities, and 5) exchange of research information. Resolution of problem areas can only be achieved through such concentrated efforts over the years. This is essentially the approach ORD followed in the now successful rice production program.

3. Areas of ORD Expertise

Korea has achieved successes and developed an agricultural infrastructure which should be studied and utilized in a regional, if not global, context. Concurrently, participation in the Title XII Program would have a pronounced impact and spread effects enabling Korea not only to solve some of her pressing problems but also to provide agricultural assistance to other developing countries.

a. Rice production is an area in which Korea could assist many nations. This country has been self-sufficient in rice for the past two years. The average national yield obtained in 1977 was 4.94 mt/ha milled rice which established a world's record. The technology and methods of achieving optimum yields should be shared with LDC's which have a marked deficit in rice production. The success of rice production is the result of several years' training of specialized research and general extension staff. Several areas are involved, including: rice cultivation and cultural practices; rice breeding; plant protection; and, pest forecasting. These aspects are all necessary components of a succeessful, and sustained, rice production program. To futher assist in rice production, ORD has established an extensive cold water tolerance laboratory and field station at Chuncheon. This facility will contribute significantly to the development of cold and disease tolerant rice varieties in upland and temperate areas.

b. Rural extension is the key to the adoption of any successful agricultural program. The success of the Korean rice production program is the direct result of a vigorous and effective rural extension effort. The program is prefaced on an intensive 4H program, which is only exceeded in scope by the U.S. Extension Service, and the Saemaul Undong or "New Community Movement"

in Korea. A total of nearly 23,000 personnel received Saemaul training in 1976, which focuses on the organization, practices, and methods necessary for effective rural extension programs. Successful extension programs are lacking in LDC's, so the study and training in Korean rural extension would be most appropriate.

c. Soil management practices have also contributed to the success of rice production in Korea. With the relative scarcity of arable land, it had been necessary to obtain optimum and sustained production from existing fields. This factor is further emphasized by the average land holding, 0.96 ha per farm household. Soil fertility has been maintained through composting and related associated cultural practices. With the assistance of international programs, the fields of soil chemistry, plant nutrition, and soil survey have been developed extensively in Korea. These components are also necessary for optimum crop production, and instruction and methodology could be offered in these area.

d. Vegetable and fruit production is secondary to cereal production, yet necessary for a complete balanced diet. With regards to the LDCs, ORD can offer specific assistance in breeding and production of: red pepper, garlic, Chinese cabbage, Chinese radish and fruit, including citrus, apples, peaches and pears.

4. Specific Means of Offering Assistance

The type of assistance which could be offered in each of the above areas includes: 1) in-country invitational training of LDC researchers, 2) visits by Korean specialists on specific problem areas, 3) joint research between the LDCs and ORD and, 4) exchange of research information. The Korean environment and farm management practices are not unlike those found in many South-eastern Asian countries and some other LDCs. Training these LDC researchers in Korea would be more appropriate given the similarity in environments.

5. Past Efforts for Participation in Title XII

After the Title XII Program was announced in December, 1975, ORD expressed officially its desire to participate in the program. Repeated efforts on ORD's part resulted in the signing of a Memorandum of Understanding with the University of Missouri-Columbia in January 1978. A copy of this Memorandum of Understanding is attached in Appendix IV.

There has been no noticeable activity to date generated under this Memorandum of Understanding with the exception of a visit by some professors from the University of Missouri at ORD's expense. These professors were fully briefed on current ORD activities.

Korea, as a nearly fully developed country would not be eligible for direct funding under the Title XII Program. It could, however, participate via contracts or sub-contracts for the required services.

The Korean participation in the Title XII Program must be considered by the Board for International Food and Agricultural Development as innovative triangular cooperation involving institutions in the United States, Korea and other LDCs. The benefits of such cooperation would have far reaching consequences in international agricultural research for increased food production.

V. RECOMMENDATIONS

A. Improve the salaries of research personnel to make them competitive with those paid to university staff of comparable status. This should have the highest priority possible.

B. Revise the personnel system of ORD to provide two parallel ladders for advancement, one for active research workers and the other for management. The system should provide for the advancement of research workers to grades and salaries equal to those of management personnel.

C. Start an all-out program for the training of research personnel in the use of the English language, beginning with people newly-inducted into the ORD Service.

D. Start a crash program for the training of subject-matter specialists in plant pathology and entomology in order to alleviate critical shortages in these specialities. Provide for wider cooperation at the project level between discipline and crop-oriented scientists.

E. Provide for a centralized biometrics unit which: (1) will supply advice and assistance to all research workers on design, data collection, and interpretation of the results of the experiments, and (2) will provide a computerized data analysis service.

F. Provide for the close coordination of all ORD libraries under the leadership of the central ORD library facility and provide an adequate and guaranteed budget to ensure the exchange of knowledge within ORD.

G. Organize the management of several support service facilities (library, centralized biometrics/computer service unit and centralized laboratory) under the office of the Deputy Director General.

H. ORD budget be increased by December, 1978 to include CIRC supplementary budget for research, apartment house operation as appropriate, and cover salaries and administrative costs of CIRC supplementary personnel appointed and regularized to full ORD status.

I. Continued emphasis should be placed on soybeans and potatoes. The program on soybeans has not been emphasized within ORD to the degree of its importance as a food crop in the country.

J. The cropping systems activity should be formally established in ORD as a section within the Research Bureau or as a Division in the Crop Experiment Station.

K. The remaining recommendations of the KASS Report pertaining to livestock improvement in Korea, with assistance from ORD, should be implemented.

L. Korea should be recognized as a middle-income country that can now assist developing countries in some technical fields.

M. Korea should seek participation in the Title XII Program on an innovative triangular cooperation basis involving institutions in the United States, Korea and other LDCs. This proposal should be presented to the BIFAD Board.

N. All I. D. Committee deliberations must be presented in both English and Korean, or else the contribution of the expert consultants may be lost.

O. All CIRC research program changes after I. D. meetings and steering committee approval should be approved through the respective I. D. Committees.

P. Upon termination of this project, CIRC personnel should be regularized and given permanent status. All research projects should also be continued by the ROKG.

VI. LITERATURE CONSULTED

1. ASPAC/FFTC and ROK/MAF/ORD. 1977. Lecture meeting on farm mechanization for small farmers (Sept. 12-16, 1977). 206 mimeo pp.

2. ASPAC/FFTC and ROK/MAF/ORD. 1977. Lecture meeting on soybean production (Sept. 14-18, 1976) 350 mimeo pp. 9 chapters separately paged.

3. Gyeong Sang Pukto (Taegu) PORD. (no date) Multiple cropping alternatives. 70 mimeo pp. +1 planting chart. (in Korean)

4. Kim, Sung Bae. 1978. Annual Report, 1977. 24 pp. The Association for Potash Research (Korean), CPO Box 1763, Seoul, Korea.

5. Korea. Ministry of Agriculture and Fisheries. 1977. Yearbook of agriculture and forestry statistics (1976). 429 pp. MAF. Seoul. (bilingual)

6. Korea. Ministry of Agriculture and Forestry. 1956. Yearbook of agriculture and statistics (1955). IV+324 pp. MAF. Seoul. (bilingual)

7. Korea/MAF/ORD. 1973. Crop Improvement AID Loan Project. 1st ed. 168 pp.

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9. Korea. MAF/ORD/Procedures for I.D. Committee, for Crop Improvement AID Loan Project.

10. Korea/MAF/ORD/CIRC. 1975. Agricultural Research AID Loan Project First Steering Committee Proceedings. 156 pp.

11. _____". 1975. Agricultural Research AID Loan Project Second Steering Committee Proceedings. 48 pp.

12. _____". 1976. _____" Third _____ 69 pp.

13. Korea/MAF/ORD/CIRC. 1977. Agricultural Research AID Loan Project Fourth Steering Committee Proceedings. 75 pp.

14. _____". 1978. _____"
Fifth _____. 90 pp.

15. Korea/MAF/ORD/CIRC. 1976. Annual Report (1975?) AID agricultural research loan #489-T-088. 43 mimeo pp. (annexes listed in Table of Contents not included.)

16. _____. 1977. ibid. 1976. 69 mimeo pp.

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19. _____. 1978. ibid (1977). Part I (Korean), 205 xerox pp.; Part II (English), 435 xerox pp. - bilingual.

20. Korea. MAF/ORD/CIRC/Cropping System Interdisciplinary Research Committee. 1976. The scope of barley and wheat production, use, and research in Korea. 164 mimeo pp.

21. Korea. MAF/ORD/CIRC/Cropping System Interdisciplinary Research Committee. 1976. The scope of multiple cropping systems, practices and research in Korea. 85 mimeo pp.

22. _____/Potato Interdisciplinary Research Committee. 1978. The scope of potato production, use, and research in Korea. 68 typescript pp. + 8 pp reprint supplement on "seed potato certification in Korea."

23. _____/Rice Interdisciplinary Research Committee. 1976. The scope of rice production, use, and research in Korea. 136 mimeo pp.

24. _____/Soybean Interdisciplinary Research Committee. 1976. The scope of soybean production, use, and research in Korea. 132 mimeo pp.

25. Korean Agricultural Sector Study Team (KASS) 1972. Korean agricultural sector analysis and recommended development strategics, 1971-1985. 183 litho pp. Braun-Brumfield, Inc. Ann Arbor MI.

26. _____. 1975. KASS Special Report No. 11. Thodey, Alan R. Food and nutrition in Korea, 1965-74. 236 pp. Mich. St. Univ., Agri. Econ. Dept. East Lansing MI

27. Lee, E. W.; D. W. Shin et al. 1975. Data for the conference studying the improvement of cropping systems. (translated title)

APPENDIX I

CHANGES DURING THE LAST GENERATION WHICH HAVE DIRECTLY AFFECTED THE GROWTH AND VIGOR OF THE COUNTRY'S AGRICULTURAL TRANSFORMATION

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1. Reforestation and grasslands establishment; all mountainous areas have now nearly been covered.
2. A communications network throughout the nation built.
3. Construction and continued expansion of superhighways and paved farm-to-market roads.
4. Rural electrification almost completed in all farm households.
5. Disappearance of thatch-roofed, wattle-wall farmhouses, giving way to better rural structures and providing additional farm refuse for compost piles to help build up the organic matter content in cultivated fields.
6. Translocation of gently sloping forest lands into upland crop and pasture lands.
7. Rearrangement of small area paddies into units of 0.2 to 0.3 ha to facilitate change to a more mechanized agriculture.
8. Reclamation of coastal inlets to develop even larger scale polder agriculture.
9. Continual expansion of the farm credit system.

10. Expansion of the agricultural cooperatives concept into the Saemaul Undong (new community development concept) where not only all farm family members become involved, but also where training and orientation courses at the national level include leaders from all walks of life (cabinet ministers, university professors, artists, businessmen, etc.) in order to make them acquainted with national development concepts.

11. Expansion of elementary compulsory education throughout the entire countryside preparatory to making middle chool mandatory as well.

12. Development and modification of mechanized agriculture.

13. Improved rural health services.

14. Rapidly increasing farm household incomes whereby farm families now have greater incomes than corresponding urban working families.

15. Government subsidy of 10% on fertilizer to farmers, with large additional amounts stored at the township level. Government buys any or all rice production from the farmer after the harvest at a nominal price thus giving the farmer more cash-in-hand to meet other expenses.

APPENDIX II

KOREAN AGRICULTURAL PRODUCTIVITY

1955 vs. 1976

Population Distribution

	1955	1976
Total population (x 10^6)	21.40	35.90
Farm population (x 10^6)	13.30	12.80
Rural population (%)	62.10	35.70
Farm households (x 10^6)	2.20	2.30
Farm household (average size)	5.99	5.47

Planted Areas (has. x 10^6)

	1955	1976
Total planted area -	2.6*	3.1*
Total cultivated area -	2.0**	2.2**
Rice paddy area -	1.2	1.3
Upland crop area -	0.8	0.9
Cropped area -	2.62	3.09
Food crops -	2.41	2.49
Rice -	1.09	1.21
Barley/Wheat -	0.68	.75
Misc. grains -	0.24	.07
Pulses -	0.31	.32
Potatoes -	0.09	.14

	1955	1976
Special crops -	0.03	0.09
Vegetables -	0.11	0.27
Fruits -	0.02	0.09
Tobacco -	0.00	0.05
Mulberry for silk -	0.03	0.08
Others -	0.00	0.01

Amounts are in MT/ha unless otherwise noted.

* 1955 crop area data are in cheongbo; 1976 data in hectares;
(1 cheongbo = 0.99174 ha ; 1 tanbo = 9.9174 are ; 100are = 1 ha.)

** Difference between "Total planted" and "Total cultivated" is area that was double or triple cropped.

Fertilizer Usage

		1955	1976
Total - Fertilizers	MT x 10^3	591.9	1349.3
Plant Food - Total -	"	164.8	643.2
N -	"	127.7	361.3
P_2O_5 -	"	28.2	142.1
K_2O -	"	8.8	139.8
Silicates -	"	0.0	350.0

Food Crop Production - MT x 10^6

Crop	1955	1976
Total -	4.52	8.21
Rice	2.96	5.21
Cereals	0.98	1.85
Potatoes	0.32	0.67
Misc. grains	0.09	0.12
Pulses	0.17	0.35

Fruit Production - MT x 10^3

	1955	1976
Total	111.2	611.0
Apples	50	311
Pears	30	64
Persimmons	13	40
Grapes	3	55
Peaches	15	85
Oranges	0.2	51
Plums	-	5

Raw Silk Production MT x 10^3

	1955	1976
Silk Cocoons -	4.1	41.7

Korean Agricultural Productivity

Unit Area Yield Comparisons - MT/ha

Crop	1955	1976
Paddy rice - polished	2.72	4.33
Upland rice - "	0.70	1.89
Wheat	1.66	2.22
Barley	1.44	2.27
White potatoes - Tubers	9.93	11.79
Sweet potatoes - roots	7.11	20.41
Millet	0.43	1.04
Maize	0.58	2.39
Soybeans	0.55	1.19
Red beans	0.46	0.98
Peanuts	0.35	0.84
Apples	5.77	7.74
Pears	6.37	5.87
Persimmons	7.65*	3.41*
Grapes	6.64	9.12
Peaches	5.36	8.75
Oranges	9.34*	4.35*
Plums	-	3.54

* See marks reverse trend needs explanation

APPENDIX III

STATUS OF TITLE XII.

1. Introduction

On 20 December 1975, President Ford announced the Title XII Act.

a. Title XII Act "International Development and Food Assistance Act--Famine Prevention and Freedom from Hunger (PL 94-161)."

b. Purpose "Authorization of an expansion and strengthening of efforts to solve food and nutrition problems in the developing countries through programs that will involve greater participation by qualified U.S. universities working in close partnership with AID."

c. Organization:

(1) Board for International Food and Agricultural Development (BIFAD)

1) Members: 7 (4 from universities)

2) Partnership with AID

3) Establishment of projects and direction of project implementation

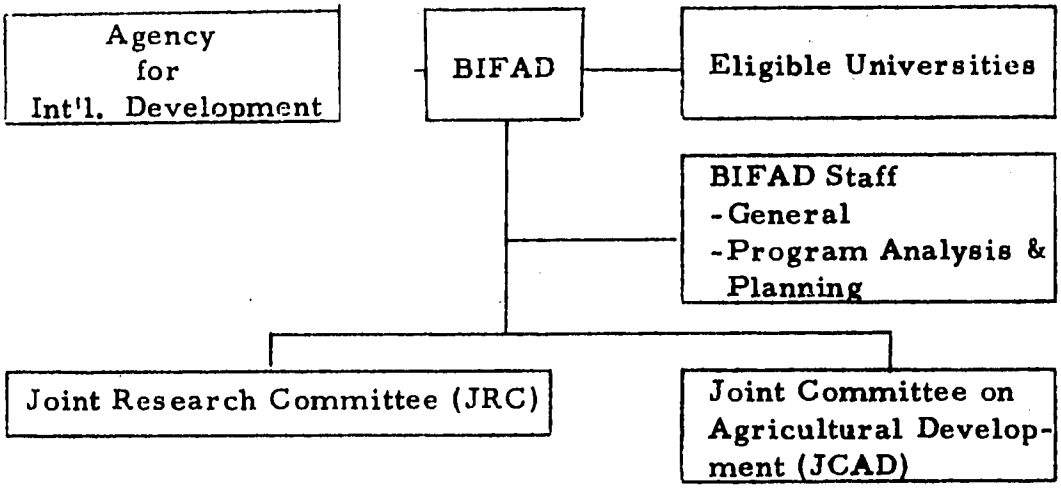
(2) Under BIFAD

1) Joint Research Committee (JRC)

2) Joint Committee on Country Program (JCCP)

3) Individual University or Consortium of Universities

(3) Diagram of Organization*



* Source: BIFAD
1977 "The First Year--A Progress Report"
Agency for International Development
Washington, D.C. p. 59.

d. Implementation

(1) Kinds of Projects

1) LDC Assistance Program (Korea not eligible)

2) Joint Research Projects

(2) Assistance Funds

1) Total Funds: FY '76 - $618.8 million
FY '77 - $745.0 million

2) Research Grants

a) Exploratory grants: Originally limited to $25,000; but ceiling raised

b) Agricultural Programmatic

c) Research Grants: no limitation

2. JRC Priority Options for Planning Contracts and Exploratory Studies for CRSPs [1]

Planning Contracts Already Underway — 1978

1. Sorghum and Millet
2. Small Ruminants
3. Fisheries
4. Human Nutrition

1978-1979**

Proposed Planning Contracts

1. Peanuts
2. Soil Management
3. Beans
4. Crop Protection
5. Roots and Tubers

Proposed Exploratory Studies*

1. Poat-harvest Losses
2. Farming Systems
3. Product Marketing
4. Vegetable Crops
5. Inputs and Services

1979-1980**

1. Feed Supply
2. Hemoprotozoan Diseases
3. Large Ruminants
4. Water Management

1. Planning and Policies
2. Small Farm Mechanizatio
3. Alternate Energy Sources
4. Production Potential

1980-1981**

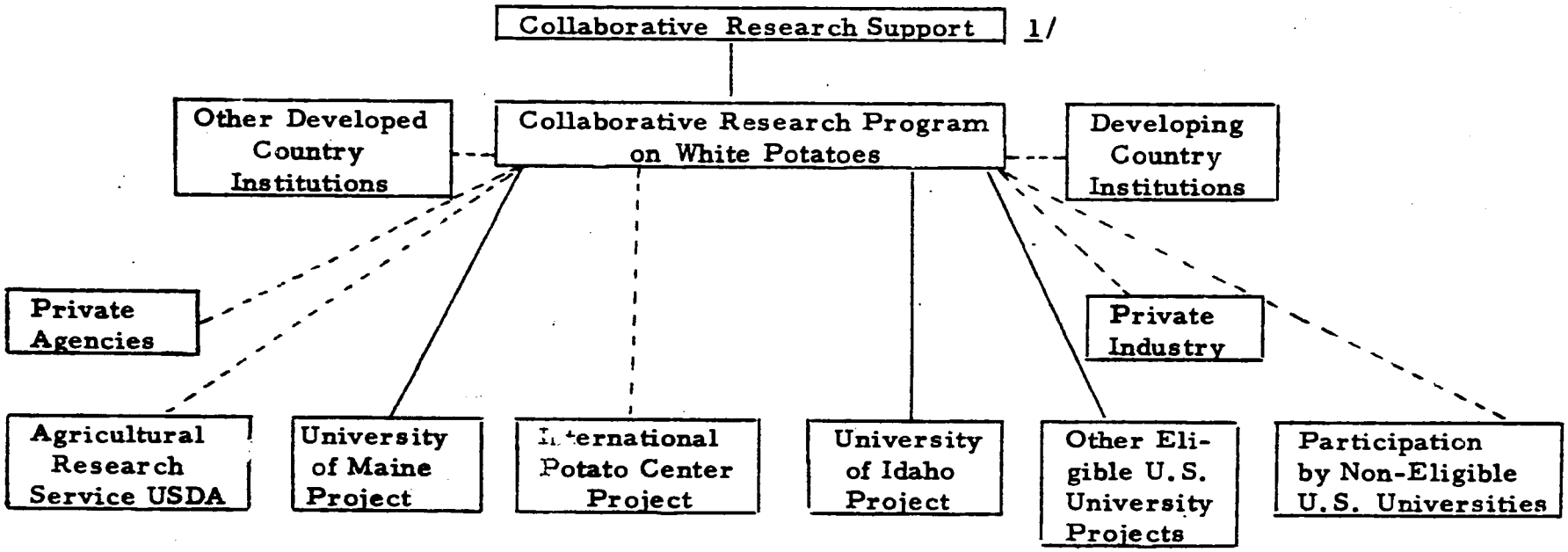
1. Maize
2. Soybeans

* Some of these might become planning contracts in the subsequent year.

** This is a proposed schedule. The proposed number of planning contracts or exploratory studies might vary a little during each year depending upon availability of funds.

1) Source: Department of State Unclassified Airgram. 6/78

3. Collaborative Research Support



1/ By definition in the Title XII legislation, support funds for Collaborative Research Support Programs may be granted only to eligible institutions as defined in that Title. In the diagram this means the linkages with solid lines indicate potential support funding of eligible institutions, through the management entity (Page 9), while dotted lines indicate funding can occur only through a contract or sub-contract for prescribed services from the management entity or one of the participating eligible institutions. As indicated on Page 10, only in the special case where the management entity itself is an eligible university can it receive support funds, in other cases its services may be obtained through appropriate contract arrangements.

APPENDIX IV

MEMORANDUM OF UNDERSTANDING

BETWEEN THE

OFFICE OF RURAL DEVELOPMENT, SUWEON, KOREA AND THE

UNIVERSITY OF MISSOURI - COLUMBIA

ON

SCIENTIFIC AND TECHNICAL COOPERATION

IN RESEARCH AND TRAINING

Whereas, the Office of Rural Development, Republic of Korea (hereafter referred to as ORD) and the University of Missouri-Columbia, United States of America (hereafter referred to as UMC) are mutually interested in collaborating on research, education and related activities leading toward possible participation by both parties in the International Development and Food Assistance Act-Famine Prevention and Freedom from Hunger (Title XII);

Whereas, both ORD and UMC wish to embark on a collaborative program of research enhancement:

Whereas, the two institutions have discussed the furthering of these interests and now desire to record their mutual understanding in this regard;

Now, therefore, both parties hereby record their understanding.

Article I

The scope of cooperation between ORD and UMC is:

1. The selection of subject fields based on agreement of both parties.
2. Exchange of scientists and technologists.
3. Implementation of cooperative research, exchange of scientific literature, information and materials, and cooperative utilization of facilities.
4. Training of ORD staff at UMC in short-term, M.S. and/or Ph. D. courses, and
5. Preparation of theses by UMC students at ORD, and
6. Cooperative participation of Korea in the UMC program with less developed countries.

Article II

In order to achieve maximum efficiency and cooperation, both parties have decided:

1. Both parties designate liaison officers.
2. All programs will be established on basis of mutual agreem and benefits from the programs will be shared.
3. Planning and budget will be decided annually by agreement of both parties, and
4. Programs will be established based on the utilization of present staff and facilities.

Article III

The parties of this agreement may, by mutual consent, add, modify, amend, or delete any word, phrase, sentence or article in this agreement. This agreement is effective as of the date of execution by the appropriate officer of each signatory institution.

The agreement shall be effective until either party serves notice on the other of its intention to terminate in which event, the agreement shall stand terminated at the end of a twelve-month period from the date of issue of such notice.

Executed for the
Office of Rural Development
Republic of Korea

Kim, In-Hwan (Sig.)

Director General

Date : January 4, 1978

Executed for the
University of Missouri
Columbia

Schooling, Herbert W. (Sig.)

Chancellor

Date : January 4, 1978